BOOKS

BY

GEORGE P. PAUL, M. D.

Nursing in Acute Infectious Fevers

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Fourth Edition

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NURSING

IN THE

ACUTE INFECTIOUS FEVERS

BY

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PREFACE TO THE FOURTH EDITION

In this fourth edition the author has added a new chapter on Transmission of Communicable Diseases; has fully rewritten the chapters on Influenza and Malaria; has added considerable new material throughout the volume, especially covering such subjects as Vitamines in the Diet of the Sick, Typhoid Fever Prophylaxis, Anterior Poliomyelitis, the Schick Test, and the Toxin-antitoxin Mixture in the Prevention of Diphtheria. Several illustrations have been added.

The author wishes to extend expressions of gratefulness to the readers of the past editions of this volume, and especially to those in foreign lands whom he happily met during his trip around the world.

G. P. P.

Antioch College,
Yellow Springs, Ohio,
January, 1923.

PREFACE

THE object of the author in preparing this book is to place before the nursing profession a volume which will be of practical service.

The subject-matter is written for the nurse, and not the medical graduate or scientific worker, hence all extraneous matter and useless discussions are not given place.

The treatment of disease by means of drugs and the physical signs are but little discussed, as these are of more importance to the medical attendant than to the nurse.

Great pains have been taken in preparing the sections on the Care and Management of each disease, as this relates directly to the duties of the nurse.

The book is divided into three parts: The first part treats of fever in its general aspects, which is necessary as a base to the study of each individual fever; the second part discusses each of the acute infectious fevers as to their cause, signs and symptoms, course, prognosis, care, and management; the third part deals with practical procedures and information necessary in the management of the foregoing diseases or of value in understanding the nature and course of such diseases.

Only illustrations and charts of a specific value are included.

The author wishes to express his thanks to Susan D. Munroe, Assistant Superintendent, Samaritan Hospital, for her kind and candid criticism.

G. P. P.

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PART I

GENERAL CONSIDERATIONS

CHAPTER I

FEVER IN GENERAL

The term "fever" is commonly applied to that condition in which the body temperature is above the normal (98.6°F.), and is usually accompanied by certain toxic symptoms, as coated tongue, accelerated pulse-rate, malaise, loss of appetite, and nervous phenomena.

The normal temperature of the human body may vary within physiological limits to a slight extent either above or below 98.6°F.

Physiologically, the temperature of a healthy adult is at its lowest between midnight and four o'clock in the morning. It is at this time, when the body functions are at their lowest, that patients ill with grave diseases are most likely to pass away. The temperature reaches its height between five and eight o'clock P. M., and then gradually decreases until early morning. In persons who toil at night instead of day this ratio may become reversed and the height is reached in the morning.

The normal temperature is lowered in several ways; insufficient diet may lower the temperature a fraction of a degree. In starvation the temperature may become very subnormal. In certain febrile diseases, either be-

cause insufficient nourishment is provided or because the patient swallows but little food, a subnormal temperature may result, especially in the beginning of convalescence. One of my cases of typhoid fever at the beginning of convalescence had attacks in which he would enter a state of collapse, the temperature would become subnormal, the skin pale and moist, but the pulse would remain normal. By careful watching we learned that he would hold the milk in his mouth until the nurse turned her back or left the room, when he would expel it. This he kept up for a week or more, probably getting only a fraction of a glassful of milk in twenty-four hours.

Cold drinks lower the temperature temporarily; cold baths lower the normal temperature. After taking an anæsthetic the temperature is also lower than before; and certain drugs, such as morphine, quinine, large doses of alcohol, coal-tar preparations, as acetanilid, antipyrin, phenacetin, etc., will lower the bodily heat. During sleep the temperature is lower than in the wakeful hours.

The normal temperature is raised after partaking of a liberal diet, or hot drinks; during digestion; by increased function of the large glands of the body; by increased mental activity and muscular exertion. In summer the bodily temperature is a little higher than in winter. Such drugs as strychnine, atropine and caffeine will raise the temperature. This is a very important point, because the continued rise of temperature in the convalescence of certain diseases, as typhoid fever, may be due to the administration of strychnine.

Degrees of Temperature.—The normal temperature is 98.6°F. or 37°C. The normal temperature of an

infant is about 99.4°F. and decreasing gradually to the normal adult temperature as full growth is obtained. After the age of 40 or 50 years the temperature decreases to about 97.8°F. and in advanced age rises again to 99.4°F. Thus in both extremes of life the temperature is about the same and is above normal.

95°F. equals Collapse temperature.
97.5°F. equals Subnormal temperature.
98.6°F. equals Normal temperature.
99.5°–101.5°F. equals Subfebrile temperature.
102°–103°F. equals Moderately febrile temperature.
104°–105°F. equals Highly febrile temperature.
Over 106°F. equals Hyperpyretic temperature.

Detection of Temperature.—This is done by means of the clinical thermometer, the bulb of which is placed under the tongue and the lips closed, the patient being warned not to bite the instrument. The thermometer is left in position from one to five minutes, depending on the grade and sensitiveness of the instrument. As a general rule the temperature is taken by the mouth, but at certain times this is either not possible or desirable. For example, it is impossible to take the temperature in young children by mouth; in adults who are in a comatose or semi-comatose condition; and in insane patients. If the tongue be dry, the recorded temperature will not be accurate, nor if the patient had recently drunk cold or hot water. Other situations for taking the temperature are in the axilla, in the rectum, in the vagina, and in the *passing* urine.

Before placing the thermometer in the axilla, the armpit should be thoroughly wiped and dried. The bulb of the thermometer is then put well into the center of the axilla, and the hand of that side placed on the

front of the chest so as to completely envelop the bulb of the thermometer with the axillary tissues. The instrument should be allowed to remain in position for five minutes. To the recorded temperature add about 0.5°F., which will bring it up to the oral temperature.

The instrument may also be placed in the rectum or vagina. It is very seldom necessary to use this method except in children, or in adults who are unconscious, delirious, or insane. If used rectally, the rectum should first be emptied of fecal matter, for if the bulb of the thermometer be inserted into a mass of feces, an incorrect reading is obtained. The rectal temperature, when properly taken, is a true index of the degree of body heat.

Another method is by allowing the patient to urinate on the bulb of the thermometer. This is an accurate method, but applicable to only a few cases.

In febrile diseases it is best to record the temperature every four hours during the acute stage of the disease.

Prognosis.—The prognosis of febrile diseases does not entirely depend on the fever, but also on the concomitant symptoms. A fever of 106°F. for a brief period is not as grave as one of 105°F. for a more extended time. An evening temperature of 104°F. in typhoid fever is of more import than fever of 105°F. in pneumonia.

A temperature of 106°F. if continued for several days is fatal (Smith). In persons over 50 years of age a temperature of 103°F. is serious.

The relation of the pulse is very important in making a prognosis. If the evening temperature does not

rise above 104°F. and the pulse is good, the prognosis is favorable. In diphtheria a temperature of 101°F. and a pulse of 120 is grave. If the temperature continue at 105°F. for four or five hours in a case of typhoid fever, the prognosis is grave.

Children tolerate a higher fever than adults. A temperature of 104°F. in a child is of the same import as

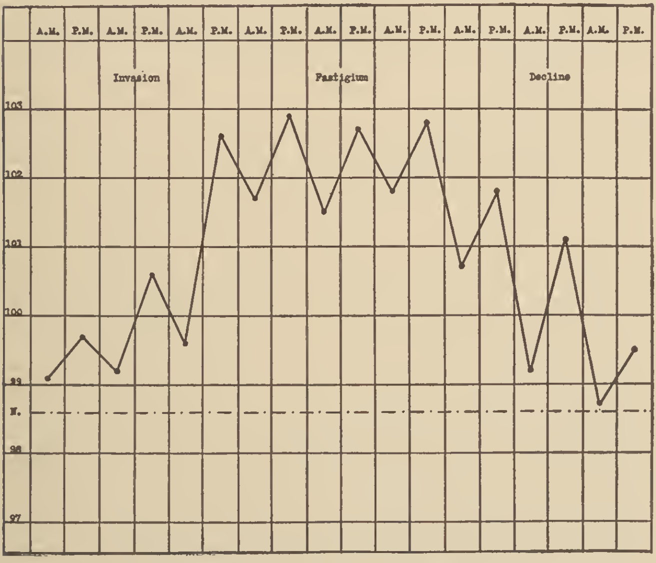

FIG. 1.—Chart showing the three stages of fever.

102°F. in an adult. Disproportion between the surface and mouth temperature is serious.

Sudden and continuous rise of temperature in the course of a disease, if all complications can be excluded, is usually antemortem.

Stages of Fever.—Fever may be divided into three stages; namely, invasion, fastigium, and decline.

Invasion extends from the beginning of the febrile manifestations until the fever reaches its height. It varies in length, degree, and character in various diseases. In typhoid fever the invasion is of about ten days' duration. The fever gradually increases in a step-like manner, with diurnal remissions for seven to ten days, when it reaches its height. In pneumonia, on the other hand, the invasion is very abrupt, and of short duration. The fever reaches its height, as a rule, in twenty-four or forty-eight hours.

Fastigium is that period when the fever is at its height, and extends from the end of the invasion to the beginning of decline. In typhoid fever the fastigium is about twelve days long. The evening rise reaches about the same height every day and the diurnal remission is less than the remission during the invasion. In pneumonia the period of the fastigium is shorter than in typhoid, lasting, as a rule, from four to six days, with hardly any remission.

Decline of fever may take place in one of two ways: by *lysis*, that is, a gradual fall of the fever; or by *crisis*—a sudden fall to normal. The principal diseases in which the temperature falls by crisis are lobar pneumonia, typhus fever, erysipelas, measles, relapsing fever, and influenza. In most other diseases the fall is by lysis.

Types of Fever.—All fevers may be placed under three heads: continued, remittent, intermittent. In *continued* fever the temperature remains at a more or less constant height, with little or no daily remission. Examples of this type are lobar pneumonia and typhoid fever. In *remittent* fever, the diurnal remission is marked, but the lowest daily temperature is still above the normal, as in malarial remittent fever and in certain

types of tuberculosis. In *intermittent* fever the temperature falls to the normal or subnormal diurnally and

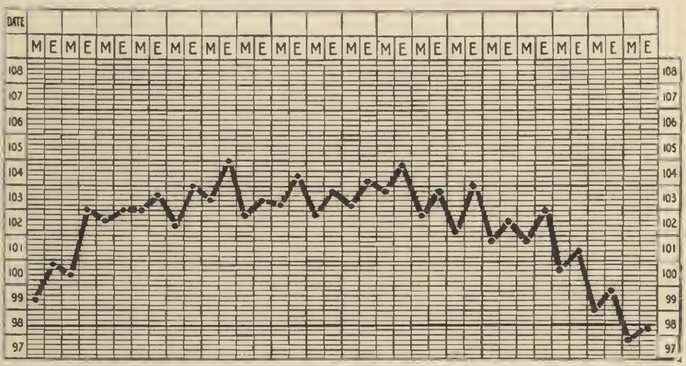

Fig. 2.—Temperature chart of a continued fever

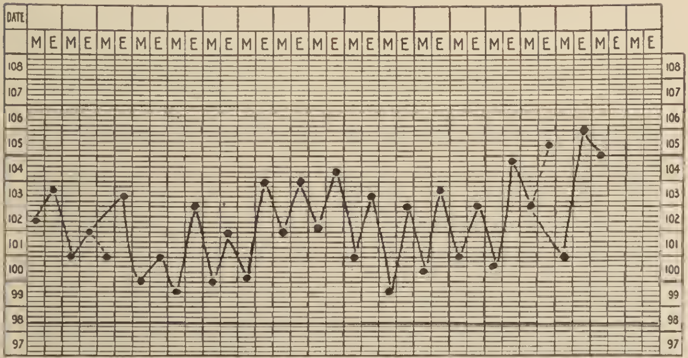

Fig. 3.—Temperature chart of a remittent fever.

again rises, as in malarial intermittent fever, relapsing fever, and certain forms of tuberculosis.

Phenomena of Fever.—Rise of temperature may be the result or the cause of other concomitant symptoms.

Among the common accompaniments of fever are headache, malaise, muscular pains, languor, chilly sensations, loss of appetite, coated tongue, tendency to yawn, flushed face, glistening eyes, nausea or vomiting, constipation as a rule, increased rate of pulse and respirations, hot and dry skin. The urine is concentrated, small in

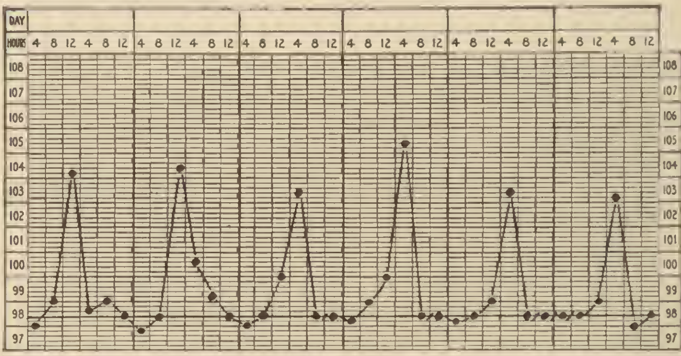

FIG. 4.—Temperature chart of an intermittent fever.

amount, dark in color, of high specific gravity and contains albumin.

Treatment of Fever.—There are eight divisions to the proper treatment of fever; namely, neutralize the poison; promote elimination; reduce the temperature if high; maintain nutrition; stimulate when necessary; relieve symptoms; prevent and counteract complications; use care in convalescence.

Neutralize poisons.—This is very difficult. In those diseases for which we have antitoxins they should be used early and in a sufficient quantity. Hypodermoclysis of normal saline solution is very useful in diluting the poisons in the blood and aiding in their elimination.

In those diseases in which toxins are formed in the intestinal tract certain disinfectants, as salol, creosote, guaiacol, and thymol, are useful.

Promote elimination by the bowels with purgatives and enemata. By the kidneys in giving plenty of water to drink; also rectal infusions and hypodermoclyses of normal saline solution. By the skin with hot packs, hot dry air, and hot drinks.

Reduce the temperature by hydrotherapeutic measures (see subsequent articles) and by means of drugs.

Maintain nutrition by food of proper quality and in proper quantity.

Stimulation and other headings under general treatment will be considered in subsequent chapters.

CHAPTER II

TRANSMISSION OF COMMUNICABLE DISEASES

The ways and means of transmission of diseases from person to person are manifold: They may be the various excretions from the body, as the nasal, oral, and pharyngeal mucus, the feces, and the urine; food, water, and milk; insects; and human carriers.

Diseases transmitted by body discharges are most common. By means of the nasal, oral, or pharyngeal discharges the following diseases may be transferred: Diphtheria, septic sore throat, scarlet fever, measles, smallpox, chickenpox, rubella, mumps, influenza, whooping-cough, lobar pneumonia, infantile paralysis, and cerebrospinal meningitis. By the bowel discharges: Typhoid and paratyphoid fevers, dysentery, and cholera. By foods, water, and milk: Typhoid and paratyphoid fevers, dysentery, cholera, diphtheria, septic sore throat, and scarlet fever. By insects: The fly—typhoid fever, cholera, dysentery, diphtheria, and sleeping sickness; the mosquito—malaria, yellow fever, dengue fever, and filariasis; the flea—bubonic plague; the louse—typhus fever; the tick—Rocky Mountain spotted fever. By human carriers: Typhoid fever, diphtheria, cholera, dysentery, infantile paralysis, cerebrospinal meningitis, and doubtlessly many other diseases.

Diseases may be transmitted by **contact.** This may be directly from the sick person or by means of some

intermediate object or person. *Direct contact* may be by kissing, touching the sick person, by the breath of the patient, by droplets from the nose or mouth of the infected individual during sneezing, coughing, or expulsive talking. *Indirect contact* may result from the handling or use of objects polluted with excretions or secretions of the patient. Diphtheria may thus be spread by means of infected lead pencils and foods. Typhoid fever, by the handling of soiled clothing from the patient or his bed.

It will be noted that one of the most important means of preventing contact infection is through cleanliness of the hands. The washing of the hands before each meal, before handling or preparing foods, after leaving the sick-room, after handling any soiled object, will accomplish much in the prevention of disease. All dishes used in the sick room should be carefully cleaned and boiled before being restored to the general dish closet. Bedclothing of the patient must be thoroughly disinfected. All discharges, whether from the nose, mouth, throat, kidneys, or bowels, should be destroyed or rendered sterile.

Diseases may be transmitted by *foods* and *drink*. *Foods* are very often the means of disease transmission. Infected oysters have caused epidemics of typhoid fever. One in particular may be mentioned. In one of the eastern universities of the United States an outbreak of 25 cases of typhoid fever resulted from the use of oysters which were infected with typhoid bacilli derived from sewage-polluted water in which the oysters were fattened. In Barbados infected biscuits were the cause of typhoid spread. Other foods, as cheese, butter, macaroni, and meat pies, have been the starting-points.

Milk is a very prolific means of disease transmission.

The milk may become infected by disease of the cow, as in the cases of tuberculosis and septic sore throat; or the infection may be derived from the hands of the milkers or milk handlers, from utensils, pails, and pans cleaned with infected water, or from water used as a diluent.

Great outbreaks of disease have been traced to infected milk. Diphtheria, scarlet fever, septic sore throat, and typhoid fever are commonly spread by means of milk. In an eastern town there occurred an outbreak of 30 cases of scarlet fever among members of 25 families, all of whom received milk from an identical source. On investigation it was ascertained a little child of the dairyman had recently recovered from scarlet fever. Over 50 outbreaks of scarlet fever have been traced to milk infection. In Boston in 1911 2000 cases of septic sore throat occurred as the result of infected milk from a common supply. Fifteen well-defined epidemics of diphtheria have resulted from infected milk. Over 350 outbreaks of typhoid fever have been dependent upon infected milk.

Milk may be rendered safe and free from danger. If proper attention is paid to the condition of the cows, the place of milking, the utensils used, the welfare of the milkers and the handlers a great deal of risk is averted. Pasteurization or sterilization of all milk used is the most reliable means of destroying disease germs which may be in the milk. Sterilization is brought about by boiling the milk for five minutes. This is suitable for all milk used in the general household. For infant feeding pasteurization is to be preferred, as this method does not alter the physical or chemical properties of the milk. Pasteurization consists of heating the milk to 68° C. for

thirty minutes and then rapidly chilling it and keeping on ice until used.

Water is less a carrier of infection now than in past days, for the reason that many cities and towns have taken up the matter of pure water and have either changed the source of their water-supply or have established means of purifying the water. The people have been awakened in this respect. The question of water-borne infection has not, by any means, disappeared. Many very large cities still deliver impure drinking-water to their people. The country wells and streams with their polluted water still exist.

There are on record many instances of great epidemics brought about by the use of infected drinking-water. In London in the year 1854 a great epidemic of Asiatic cholera occurred, and was dependent upon infected water obtained from a well which communicated with a drain from a cesspool into which the excreta from a cholera patient had been thrown. There resulted over 700 deaths. In Hamburg in 1892 a large outbreak of cholera arose from the use of infected river water for potable purposes. About 17,000 cases, with over 8600 deaths, was the cost.

Typhoid fever is very frequently water-borne. In the town of Plymouth, Pennsylvania, an epidemic of over 1000 cases, with 114 deaths, resulted from the drinking of infected water. Into a small stream entering one of the reservoirs infection from the excreta of a typhoid patient, living on the bank of the creek, was introduced. In the city of Cohoes, New York, in 1890 to 1891 about 1000 cases of typhoid fever resulted from the use of river water polluted by sewage from a city located 16 miles up stream. In Ithaca, New York, in 1903 an outbreak

of typhoid fever in which 1350 cases were reported resulted from the infection of the water-supply by privies located on the banks of a stream leading into the water-supply.

Great epidemics of dysentery are on record as having their origins in infected drinking-water. Diarrheal conditions often of epidemic extent have been the outcome of impure drinking-water.

The remedy against water-borne disease is vigilance and foresight on the part of municipal authorities. In rural parts, where each householder establishes his water-supply, great care is necessary in locating the well so that no infection may enter from privies, either through the soil or especially by surface wash. A good curb at the mouth of the well will often prevent pure water from becoming impure. *When in doubt, boil all drinking-water.*

Diseases may be transmitted by **insects.** The mosquito is guilty of transmitting malaria, yellow fever, filariasis, and dengue fever. Flies may carry typhoid fever, tuberculosis, dysentery, and cholera. The fly is the established transmitter of sleeping sickness. The flea carries bubonic plague and also kala-azar. The louse transmits typhus fever and probably relapsing fever. The tick is concerned with the spread of Rocky Mountain spotted fever. It will thus be seen that the insect plays no small part in the dissemination of many diseases. In some cases the insect acts simply as a mechanical carrier of disease, as exemplified in the adhesion of germs to the bodies of flies. In other instances the insect is an essential link in the transmission of disease. This is the case in malaria, yellow fever, bubonic plague, filariasis, and typhus fever.

Disease may be transmitted by **human carriers.** Very much is heard nowadays regarding this type of disease

transmitter. A person not apparently ill and who harbors or carries germs of disease is called a *carrier*. This person may have recently recovered from a disease, but is not free from its organism and is capable for a limited time of giving the disease to others. This type of carrier is known as the *acute carrier*. A person recovered from a disease, but harboring for a great time—weeks, months, or even years—the organisms of that disease, is called a *chronic carrier*. A person who has never had the disease whose germs he is harboring and shedding for a time is called a *temporary carrier*. The human carrier of disease is an extremely common person. Without doubt the human carrier of disease plays a much greater part in the dissemination of maladies than is really suspected.

Diseases known to have been scattered in this way are: typhoid fever, dysentery, cholera, diphtheria, malaria, lobar pneumonia, infantile paralysis, and cerebrospinal meningitis, and probably measles, scarlet fever, whooping-cough, and, indeed, all of the so-called contagious diseases.

CHAPTER III

HYGIENE OF THE SICKROOM

Ventilation.—One of the most important considerations of the sickroom is its *ventilation*. The refuse or altered products of all substances taken into the body for its nourishment are eliminated as worthless to the human economy and are not to be introduced into the system. This is just as true in regard to the respiratory system. Air rich in oxygen is inhaled; the oxygen is used to maintain the vital processes, and a combustion product, known as carbon dioxid, and certain organic materials worthless to the human being, are exhaled, and are not supposed to return to the body. This makes it necessary to provide a free exit for these substances from the breathing area of the person.

The oxygen of the inhaled air combines with certain elements of the blood and displaces the carbon dioxid of the blood. This latter has been carried by the circulation from the different parts of the body to the lungs, and is eliminated in the expired air, together with a small amount of organic material.

If a person be confined in a closed room, he will in a certain time, depending on the size of the room, have used all the available oxygen of the air and have replaced it with carbon dioxid and organic matter.

The estimated amount of air space necessary for one person is about 2000 cubic feet with a supply of about 1500 cubic feet per hour.

Now let us consider the sick person. If a fresh supply of air be necessary for an individual who is physically strong and in perfect health, how much more necessary is fresh air to a person whose body is debilitated by illness, whose vital processes are being hampered by high fever and toxins? How necessary is it to give free exit to the expired air, not only containing carbon dioxid and organic matter, but also the products of bacterial life, and in some instances bacteria themselves?

Ventilation of rooms is brought about in several ways. By disproportion between the temperature of the rooms and that outside; by the natural diffusion of gases; by openings allowing the free entrance and exit of air. We will deal only with the last-mentioned means.

There is a vast difference between draughts and ventilation. The former are a source of injury but the latter is not only not injurious, but very necessary. Some people think that in order to ventilate a room it is necessary to create a draught.

There are two useful methods of supplying fresh air to the patient. The first is by continuous free ventilation; that is, by having a large supply of air entering the room constantly. The second method consists in having a more limited constant supply, and then several times a day, after covering the patient's body well and placing a thin cloth over his face, opening the windows widely for a brief time.

In many modern dwellings the system of ventilation

is perfect and in these cases manipulating the windows is unnecessary, but as a general thing, ventilators in houses are such in name only.

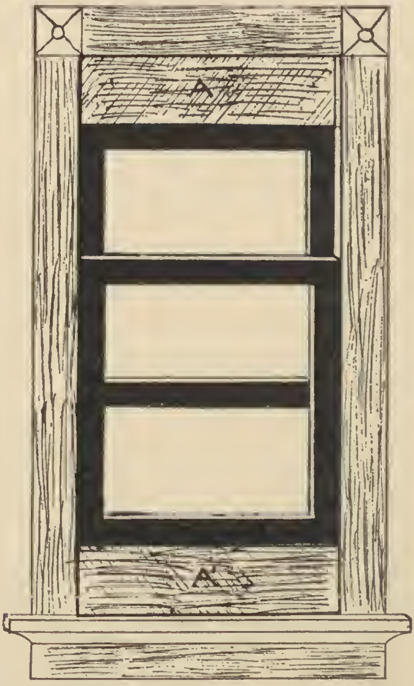

FIG. 5.—Window ventilation. A, A′. Inserted boards.

A very practical method of arranging the windows is as follows: Lower the upper sash from three to six inches, raise the lower sash the same distance, and fill in the open spaces, above and below, with pieces of

board that exactly fit the window frame. At the center of the window there is then formed an air space between the lower part of the upper pane of glass and the upper part of the lower glass, and this space com-

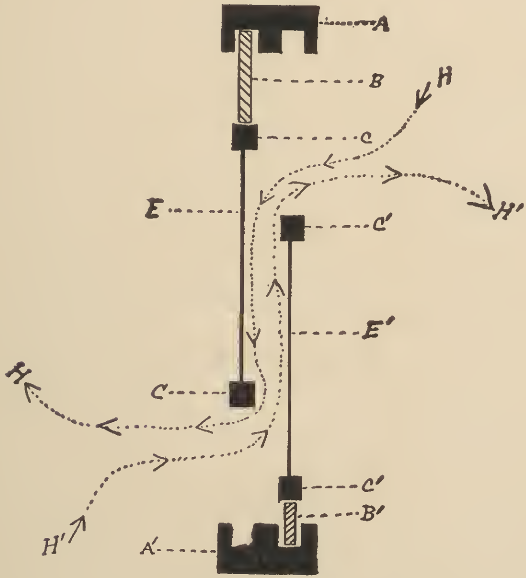

FIG. 6.— Diagram of window ventilation (side view). A, A′, window frame; B, B′, inserted boards; C. C′, window sash; E, E′, window glass; H, H′, currents of air going in and out.

municates both with the outside air and the inside of the room to be ventilated. (See illustrations.)

All kinds of flames, as in stoves, lamps, and gas jets, use up the oxygen of the air. These not only consume that which is of vital importance to the patient, but also vitiate the air with poisonous and oppressive gases.

Do not burn more gas or oil in a sickroom than is absolutely necessary. It is stated that an ordinary gas burner in use consumes more oxygen in one hour than a person would use in six hours.

Dr. Wm. P. Northrup, of New York, has said: "If you wish to kill a child who is sick with pneumonia, close your windows, start the gas stove, burn a few gas jets, have plenty of friends in the room to help use the air, and have the temperature of the room above 80°F."

We have considered the quantity of air. Of next importance is its quality. The air should be of a certain temperature. If the person be very feverish, the temperature of the room should be between 65°F. and 68° F., and when the temperature of the patient becomes normal or falls below the normal, the temperature of the room should approach 70°F.

Perfectly dry air is very irritating to the respiratory passages, and normally air should be a little moist. In houses heated by hot air furnaces it may be necessary to dampen the air. This is done by hanging in the room towels or cloths dampened with water; or in some cases, especially when the patient is ill with a disease of the respiratory tract, a steaming apparatus is very useful. Moisture may also be furnished by simply boiling water in the room.

The Room and Its Furniture.—The room should be of fairly good size so as to provide plenty of air space. Southern exposure is to be selected if choice be given. Plenty of sunshine will not only enliven and brighten the patient, but it also acts as a bactericide. The eyes of the patient should not face the bright light. Only such furniture should remain in the room as is absolutely necessary—a bed, one or two small stands, and a couple

of chairs. In cases of contagious diseases the pictures and curtain hangings should be removed.

Do not allow unused glasses of water to remain in the sickroom, and plants and flowers should be excluded. A very ill patient will not recognize or appreciate flowers, and if he wishes to see them they might be placed in an adjoining room within the sight of the patient.

During the insect season the windows and doors of the sickroom should be thoroughly screened. Mosquitoes and flies must be kept from the patient's room, because of their annoyance to the sick person and their likelihood to disseminate disease.

Preparation of Bed.—The proper preparation and care of the bed is one of the most important duties of the nurse. The principal considerations are that the bed should be neither hard nor soft; the bedclothing should be smooth, and the coverings should be sufficient but light.

Over a good hair mattress are smoothly placed, first, a soft blanket, then a cotton sheet. A draw-sheet is a very convenient addition. This consists of a sheet so folded as to be about three or four feet wide, placed crosswise on the undersheet and tucked in under the mattress at the sides. It should be placed so the buttocks of the patient are midway between the upper and lower edges of the draw-sheet. If necessary, a piece of rubber sheeting or table oilcloth may be put under the draw-sheet to protect the under-bedclothing from discharges. Over the patient should be placed a soft cotton sheet and a light blanket or quilt. Do not tuck these top pieces of bedclothing tautly under the sides of the mattress, for it is very annoying for the patient

to have the clothing weight down or pull on the toes when he is in the supine position.

The bedclothing of a fever patient should be changed without any active movement on the part of the patient. By means of a draw-sheet, the patient may be drawn from one side to another of the bed, when the soiled under-bedclothing may be rolled up as far as the body of the patient and the clean clothing be applied over the uncovered portion of the bed, with the excess folded and placed beside the patient's body; then, by means of a draw-sheet, the patient may be lifted over the pile of soiled clothing and the folds of new clothing on the freshly prepared portion of the bed, when the remainder may be adjusted and a new draw-sheet applied.

Probably the most convenient form of body clothing for the patient is a short cotton gown, fastened at the back with tapes.

Quiet.—Quietness in a sickroom is very essential. Only those persons whose services are needful should be allowed in the room, and under no circumstances should any person outside of the immediate family and spiritual advisor be permitted to enter the room during the acute course of the disease.

Loud talking and noises of all kinds should be prohibited both inside and outside of the room. All conversation in the sickroom should be carried on in a low, soft voice, but not in a whisper. It is very unwise to converse in the sickroom in such a manner that the patient can not hear it, for it at once arouses his curiosity and may excite him. If you have anything to say to the physician or attendants which the patient should not hear, postpone saying it until you leave the room.

In the acute fevers of children probably quiet is even

more necessary than for adults. The child should rest quietly in bed and not held in the laps of elders and passed on from one to another, as this is very enervating and exhausts the little patient, and may bring about a fatal issue which otherwise could be averted. Attempts should not be made to entertain small children ill with one of the fevers, neither should they be urged to look at pictures or read to. Every chance should be given the recuperative powers to bring the little patient again to the state of health.

The clothing of the child should be light, and swaddling be relegated to the domain of ancient customs. The feet of all ill children should be kept warm by means of the hot-water bags, hot foot-blankets or heated irons or cloths. The room should be well ventilated and the access of fresh air made free.

The child should be urged to drink sufficient water. A daily morning cleansing bath of warm water is required and a nightly warm bath is conducive of restfulness. A daily bowel movement is very important.

The febrile disturbance in children is best met by means of a cool or tepid-water sponge followed by an alcohol rub, and by the employment of cold chest and abdomen packs.

The diet, as in adults, should be reduced.

CHAPTER IV

DIET OF THE SICK

A *food-stuff* is that substance which, when introduced into the human body, is digested and assimilated, aids in the formation of new tissues, prevents the waste of tissue, or helps in the production of heat and energy.

Food is a collection of foodstuffs to supply those elements necessary to maintain life. The five fundamental foodstuffs are nitrogenous bodies, as proteids, carbohydrates, fats, inorganic salts, and water. The principal elements found in foodstuffs are nitrogen, hydrogen, oxygen, carbon, phosphorus, and sulphur.

The *proteids* contain all the mentioned elements, and serve to form new tissues, supply nervous energy, and create heat.

The *carbohydrates* contain hydrogen, oxygen, and carbon, provide heat or at times form fat, but cannot form other tissues.

The *fats* contain the same elements as the carbohydrates, and perform the same functions.

The *water* and *salts* supply and keep up the normal percentages of these substances in the body.

From what has been said above it will be easily understood that an absolute diet of fats and carbohydrates will not suffice, as these bodies do not supply nitrogen which is necessary for building new tissues. On the other hand, life may be sustained on a diet with these two food-stuffs omitted.

The chief requisites of food are that it be well cooked;

that it be in good form; be pleasing to the eye; taste well, and contain in good proportion all those elements necessary to maintain life.

Vitamins.—Until recent years we were of the opinion that if food for the sick and the well contained certain proportions of fats, proteins, and carbohydrates, it was approaching the ideal. Now we know that perfect foods must have other than these three very important elements. We find that compounds called *vitamins* are very necessary to the human economy. We realize that these substances are needed for the proper growth, development, and protection of the individual. So far as scientists know the vitamins exist only in name and effect, that is, they have not been separated and shown to exist as actual substances or matter. We know that these vitamins are really necessary by the dire effects of their absence. The vitamins cannot be stored up in the human body like fat or muscle, but must be taken in day by day for immediate use.

The vitamins are divided into three main classes which are called A, B, and C. Vitamin A is found very largely in milk, cream, butter, eggs, liver, whole wheat, cabbage, lettuce, spinach, and carrots. Vitamin B exists in cabbage, beans, celery, cauliflower, corn, milk, yeast, and spinach. Vitamin C is found in apples, cabbage, lettuce, onions, oranges, potatoes, turnips, spinach, tomatoes, and milk. It will thus be seen that milk contains all three groups of vitamins and, therefore, should be an ideal food. Cabbage and spinach are also rich in each of the vitamins and may form a part of the diet in late convalescence when the return of strength and vigor to the patient is all important. For reasons given above and those to follow milk should form a very large part of the diet of the sick. The health of adult and child will

not go amiss by adding plenty of fresh milk to their regular dietary. Vegetable oils and their products, as olive oil, cotton-seed oil, margarine, and other like preparations do not contain many vitamins. On the other hand, butter which is derived from an animal fat is rich in vitamins.

Vitamins A and B are not easily harmed or destroyed by moderate heat or cooking. On the contrary, vitamin C is very readily destroyed by heat, and should be provided by means of uncooked foods, as milk, oranges, apples, turnip juice, and tomatoes.

Frequency of Feeding.—In acute infectious fevers food plays as important a part as medicines. It is in these cases that "support" of the patient depends on the food.

During the course of the disease food must be given just as regularly as medicine, every two or three hours being usually frequent enough. About night feeding there is much debate, some authorities not wishing their patients awakened for food. It is an established fact that the vital functions are at their lowest in the early morning hours, and often a glass of milk or other nourishment has turned the tide for the better in adynamic conditions at this time. It is better to give the medicine and nourishment at the same time during the night, so as to avoid frequent awaking of the patient.

Milk.—No one substance forms an ideal food, but of all substances milk comes nearest to being perfect. In milk all the elementary foodstuffs will be found. Proteid in the casein; carbohydrates as milk sugar; fats in the cream; inorganic salts as calcium phosphate, potassium chlorid, etc.; and water represented by the fluid portion. The three groups of vitamins are very

well represented in fresh milk. This adds greatly to the value of milk as a food for the sick and well.

In fevers milk forms the sole diet. The subject has been the cause of much debate and good points have been brought up on both sides. Those in favor of a milk diet say that life can be supported indefinitely on milk, that it is not irritating to the intestinal tract, that it leaves very little residue, that it is easily obtained and is cheap, that it is readily digested by most persons and if not, it may be artificially digested. Other authorities say that to many individuals milk is distasteful, it causes the formation of gas and tympanites, that it does not contain in proper proportion the elements necessary to the sustenance of animal life, that the excess of lime salts predispose to thrombi formation, that in order to get sufficient nourishment enormous amounts must be given, which will overburden the digestive apparatus.

The *daily amount* of milk necessary is between three pints and two quarts. If five ounces of milk be given every two hours, it will, as a rule, be sufficient. Many persons cannot take undiluted milk. In these cases the milk may be diluted with lime water, barley water, oatmeal water, or vichy.

In profound conditions the process of digestion must be aided. This may be done by giving pepsin and dilute hydrochloric acid after the administration of the milk, or by digesting the milk wholly or in part (see *peptonized milk* below).

It is often necessary when nursing children are taken ill with a contagious disease, to cease feeding them with the milk from the mother's breasts, and to modify cow's milk so that it will approach the composition of the mother's milk. Following will be found a convenient scheme for modifying cow's milk.

MODIFICATION OF COW'S MILK FOR INFANT FEEDING

I. Compositions of the Various Milks.

	Percentage of Fat.	Sugar.	Proteid.
(a) Cow's Milk,	4	4	4
(b) Gravity Cream,	16	4	4
(c) Human Milk (high),	4	7	2
(d) Human Milk (low),	3	6	1

II. Feeding at Various Ages.

(a) Birth to 1st Month,	1	6	1
(b) Birth to 1st Month,	2	6	1
(c) Birth to 1st Month,	2	6	0.66
(d) 2nd to 4th Month,	3	6	1
(e) 4th to 12th Month,	4	7	2
(f) After 12th Month,	4	4	4

III. Daily Feedings and Amount of Milk.

(a) 1st Month, 8 Day and 2 Night Feedings, each 2 Ounces.

(b) 2nd Month, 8 Day and 1 Night Feeding, each 3 Ounces.

(c) 3rd Month, 8 Day and 0 Night Feedings, each 4 Ounces.

(d) 4th Month, 7 Day and 0 Night Feedings, each 5 Ounces.

(e) 6th Month, 6 Day and 0 Night Feedings, each 7 Ounces.

(f) 10th Month, 5 Day and 0 Night Feedings, each 8 Ounces.

IV. Total Daily Amount of Milk.

(a) 1st Month, 20 Ounces.
(b) 2nd Month, 27 Ounces.
(c) 3rd Month, 32 Ounces.

(d) 4th Month, 35 Ounces.
(e) 6th Month, 42 Ounces.
(f) 10th Month, 40 Ounces.

V. Methods of obtaining the Various Compositions.

(a) Formula 1-6-1.

	Parts.	Fat.	Sugar.	Proteid.
Milk,	(2)	8	8	8
Boiled Water,	(6)	0	0	0
	(8)	8	8	8
		1	1	1
Sugar of Milk 5%,			5	
		1	6	1

(b) Formula 2-6-1.

Milk,	(2)	8	8	8
Gravity Cream,	(1)	16	4	4
Boiled Water,	(9)	0	0	0
	(12)	24	12	12
		2	1	1
Sugar of Milk 5%,			5	
		2	6	1

(c) Formula 2-6-0.66.

Gravity Cream,	(2)	32	8	8

Milk,	(1)	4	4	4
Boiled Water,	(15)	0	0	0
	(18)	36	12	12
		2	0.66	0.66
Sugar of Milk 5%,		5		
		2	6(—)	0.66

(d) Formula 4-7-2.

Gravity Cream,	(1)	16	4	4
Milk,	(2)	8	8	8
Boiled Water,	(3)	0	0	0
	(6)	(24)	12	12
		4	2	2
Sugar of Milk 5%,			5	
		4	7	2

(e) Formula 3-6-1.

Gravity Cream,	(2)	32	8	8
Milk,	(1)	4	4	4
Boiled Water,	(9)	0	0	0
	(12)	36	12	12
		3	1	1
Sugar of Milk 5%,			5	

VI. An example: The child is four months old and must be fed artificially. How will the nurse prepare

the milk? Tables II and III tell me that a child of four months will require seven day feedings, each of five ounces of a milk whose composition is 4-7-2. Table V (d) says this formula is made by taking 1 part of gravity cream, 2 parts of cow's milk, 3 parts of boiled water and five per cent. of milk sugar.

Table IV shows that the amount to prepare for one days is thirty-five ounces. Therefore, take of gravity cream, 1 part or five and five-sixths ounces; of cow's milk, 2 parts or eleven and two-thirds ounces; of boiled water, 3 parts or seventeen and one-half ounces; of milk sugar, five per cent. or one and three-fourth ounces. It is best to replace part of the water with lime water (two or three ounces).

Gravity cream is obtained by removing the cream from a vessel of milk which has been allowed to stand in a cool place, preferably on ice, for four or five hours.

The question of diet for sick children seems to be a difficult one for most mothers. The food is usually given according to the child's whims and caprices rather than for its welfare. Diet should be strictly regulated as to form, quantity and frequency. I have seen but few ill children but what will soon take the food prescribed, regardless of their former habits, if handled rightly. A sick child is not the proper person to consult regarding its diet. For all children, except in very exceptional cases, milk will form the basis of diet. To those under twelve months it will be the absolute diet, whereas those older may have other articles added.

Children under twelve months if on the bottle may continue on the same mixture but made one-third to one-half weaker by the addition of plain boiled water. For breast-fed infants the reduction may be accom-

plished by giving the child water or barley water before each nursing. If it is necessary to put a breast-fed child on a bottle the following formulas may help.

One to three months:

Gravity Cream,	2 ounces
Milk,	6 ounces
Sugar of Milk,	1 ounce
Lime or Barley Water,	2 ounces
Boiled Water to make	32 ounces

Give two to four ounces every two hours during day and four hours at night.

Three to six months:

Gravity Cream,	3 ounces
Milk	10 ounces
Sugar of Milk,	1 ounce
Lime or Barley Water,	4 ounces
Boiled Water to make,	40 ounces

Give four ounces every two hours during day and four hours at night.

Six to nine months:

Gravity Cream,	4 ounces
Milk,	15 ounces
Sugar of Milk,	1 ounce
Lime or Barley Water,	6 ounces
Boiled Water to make,	42 ounces

Give four to six ounces every two hours during day and four hours at night.

Nine to twelve months:

Gravity Cream,	6 ounces
Milk,	20 ounces
Sugar of Milk,	1 ounce
Lime or Barley Water,	6 ounces
Boiled Water to make,	48 ounces

Give four to six ounces every two hours during day and four hours at night.

Eggs contain all elements, but the amount of carbohydrates is very small. Eggs in the form of egg water or albumen water (see below) are very useful in fevers; also as egg nogs, punches, and prepared in various ways.

Meats are rich in nitrogenous material, and are useful chiefly in the forms of broths, consomme, etc.

Meat broths have a tendency to cause diarrhea when given in fevers. For various meat recipes see below.

Fever Diet.—The dietary of a person ill with any of the infectious fevers is a question of vital importance. The author, after much study, now follows more or less closely the following scheme.

From six or eight o'clock in the morning until eight or ten o'clock at night, the patient is placed on two-hour feedings, but during the night the interval between feedings is extended to four hours.

Alternate feedings must consist of a glass of milk to which has been added the beaten white of one egg and two teaspoonfuls of milk sugar. If raw milk can not be taken then it may be peptonized before the egg white and milk sugar are added. The odd feedings may vary, consisting of any of the following articles: junket, gelatine, albumen orangeade, cream of wheat gruel, cocoa,

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farina gruel, boiled rice, custard, tapioca cream, oyster milk, clam milk, luap and koumiss.

Meat broths or any meat derivative are omitted from fever dietary by the author because of their liability to irritate the kidneys. These organs usually feel the brunt of the toxemia of the febrile diseases and should not be further taxed by the diet.

Below is appended the recipes for preparing foods useful in the course or convalescence of fevers.

RECIPES FOR SICK DIETARY

Barley Water.—(I) Mix one tablespoonful of barley flour with four tablespoonfuls of cold water, make a smooth paste free from lumps. Pour this into a pan containing one pint of boiling water and stir while boiling for five minutes.

(II) Place one tablespoonful of pearl barley in a pan and add one pint of cold water and boil for a few minutes, then pour off the water and replace with one and one-half pints of clean water and allow it to simmer gently for one hour. Strain.

Oatmeal Water.—To one pint of cold water add one tablespoonful of oatmeal and boil for three hours. Replace water as it boils away, and then strain.

Arrowroot Water.—Make a paste of two tablespoonfuls of arrowroot powder with a small amount of cold water; then add gradually, stirring constantly, one pint of cold water. Let it simmer for five or ten minutes.

Albumen Water.—Strain the whites of several eggs through a cloth, add an equal amount of cold water, and stir well. A little lemon juice and salt may be added to taste.

Toast Water.—Toast to dark brown, but do not burn, three slices of dry bread. Place in a dish and pour over them two pints of boiling water. Cover well and let stand on ice until cold; then strain and add sugar and flavoring agents.

Rice Water.—Place two tablespoonfuls of cleaned rice in one quart of boiling water, and let simmer for two hours. Strain and add salt.

Lime Water.—Place a piece of lime the size of a small egg in a quart, tight-stoppered bottle, and add a half-cupful of cool water; allow to stand over night and strain. To this washed lime add one quart of fresh cool water, shake occasionally and allow to stand for twenty-four hours. The clear supernatant liquid is then ready for use.

Flaxseed Tea.—Take of whole flaxseed one ounce, sugar one ounce, licorice root one-half ounce, and lemon juice one ounce. To these add one quart of boiling water and allow the whole to stand in a hot place for four hours. Strain and use.

Imperial Drink.—To a quart of boiling water add two level teaspoonfuls of cream of tartar, the juice of one lemon, sugar to taste, and serve cold.

Beef Tea.—Grind or cut fine one pound of lean beef and with a pint of cold water place in a saucepan and let it stand for one hour, then place on stove and allow it to simmer for thirty minutes, strain and season with salt.

Meat Jelly.—Boil slowly in as little water as possible a four-pound chicken until tender, then remove the meat and let the liquor simmer until quite concentrated. Add salt to taste and pour into a mold or bowl and allow to thicken.

Raw Meat Juice.—Mince finely one pound of lean beef and place in a vessel with sufficient cold water to cover it. Let stand for four hours and strain through cloth.

Whey.—Powder a rennet or junket tablet and mix with two tablespoonfuls of water. Heat one quart of milk until luke warm, add the rennet solution and stir until mixed. When the mass is coagulated cut up with a silver knife and strain off the whey. Sweeten to taste.

Wine Whey.—Bring one pint of milk to the boiling point and add one gill of sherry wine. Allow to stand in a warm place for ten minutes and strain. Lemon juice may be used instead of wine.

Milk Punch.—To a glass of milk add two teaspoonfuls of brandy or whiskey, and sweeten to taste.

Junket.—To one pint of sweet milk add a pinch of sugar and two teaspoonfuls of liquid rennet, or a half-grain tablet of rennin, in a tablespoonful of water, then pour into a proper receptacle and place near stove until coagulation begins, when it is cooled.

Cocoa Junket.—Rub into a smooth paste a heaping tablespoonful of cocoa powder, a tablespoonful of sugar and sufficient hot (boiling) water. Thin with three cupfuls of milk and add the rennet mixture as directed above.

Albumen Milk.—Mix equal parts of milk and albumen water (see above), shake very thoroughly and serve at once.

Oyster Milk.—Cook a quarter pint of oysters in a very small quantity of water for ten minutes, strain, and to the liquid add sufficient hot milk to make a pint. Salt to taste but add no pepper or butter.

Clam Milk.—Prepare same as oyster milk, using six clams to the pint.

Luap.—Break one or two small soda crackers in small pieces and add to them enough hot water to thoroughly soften but not drain. Place a cupful of milk on stove and heat well but don't boil. Beat a whole egg thoroughly in a small bowl and add the cracker mass to the egg and then while stirring add the warm milk. Salt, sugar and nutmeg to taste.

Boiled Custard.—Beat the yolks of two eggs with a tablespoonful or more of sugar and a pinch of salt, and gradually add, with constant stirring, a pint of boiling milk, then cook until it thickens, probably four minutes.

Egg Nog.—An egg is beaten well with a glassful of milk, and while stirring add a half-ounce of brandy or whiskey.

Kumiss.—(I) Dissolve a half ounce of sugar in three ounces of water and twenty grains of yeast in three ounces of milk. Pour both into a bottle and add milk to make one quart. Cork and wire the bottle tightly, shaking at intervals daily for four days.

(II) One quart of fresh milk, one-third of a cake of compressed yeast, one tablespoonful of sugar. Mix the yeast with a little warm water, add the sugar to the milk, which should be lukewarm, then add the yeast and stir well. Bottle as above and set in a warm place for twelve hours; then, after placing inverted on the ice for twelve hours, it is ready for use.

Peptonized Milk.—To a pint of milk add five grains of pancreatin and twenty grains of sodium bicarbonate which have been dissolved in one ounce of water. Keep at a temperature of 110° F. for one hour, then raise to the boiling point for a moment, and place on ice.

Peptonized Beef Tea.—To one pint of beef tea add

pancreatin and sodium bicarbonate as in peptonized milk, and keep at 100°F. for three hours; then strain and boil for one minute.

Peptonized Oysters.—To one-half pint of oysters which have been finely minced, add pancreatin and sodium bicarbonate as in peptonized milk, keep at a temperature of 100°F. for one hour, then add one pint of milk and keep at the same heat for another hour. Boil for one minute, strain, and salt to taste.

Peptonized Toast.—To one piece of toast, cut in small pieces, add one pint of milk and mince thoroughly; then add pancreatin and sodium bicarbonate as in peptonized milk. Raise to 100°F. for two hours, then boil for a moment, and strain or not according to the condition.

Farina Gruel.—Sprinkle slowly into a half-pint of boiling salted water two tablespoonfuls of farina and continue to boil for twenty minutes, using care that it does not burn or adhere to the pan; then gradually stir in sufficient hot milk to make a pint, and sweeten to taste.

Cream of Wheat Gruel.—Into a quart of boiling water, to which has been added a half teaspoonful of salt, slowly stir three tablespoonfuls of cream of wheat, or other like cereal. Allow to boil well for twenty minutes and add a little butter and sufficient hot milk to make a thin gruel. Sugar may be added.

Oatmeal Gruel.—Place in a porcelain pan two cupfuls of cold water and a half cup of rolled oats, allow it to boil 30 minutes and then strain through a sieve. Add sufficient hot milk to make a thin gruel. Salt and sugar to taste.

Corn Meal Gruel.—To one pint of boiling water slowly

add a tablespoonful of yellow corn meal. Allow to boil thirty minutes and thin with hot milk. Add salt and sugar to taste.

Tapioca Gruel.—Soak 1 tablespoonful of pearl tapioca in cold water over night, then strain and add the tapioca to two cupfuls of milk and boil for thirty minutes. This may or may not be strained. Add salt and sugar to taste.

Gelatine.—Soak three level teaspoonfuls of granular gelatine in a half-cup of cold water for fifteen minutes, then to it add sufficient boiling water to make a pint. Sweeten, flavor with lemon, strain, and set aside to cool.

CHAPTER V

REDUCTION OF FEVER

Fever may be reduced by two methods, the use of drugs and by hydrotherapy. The first method we will not consider.

Hydrotherapy is the use of water in the treatment of disease. Water is applied to the body in two ways, the *mediate* and the *immediate*. By the first method the water does not come in contact with the body as it is applied in receptacles made of rubber or water-tight tissues. By the immediate method the water is brought in direct contact with the skin.

Mediate Method.—The *ice-bag* is probably the most common form of mediate application. These bags

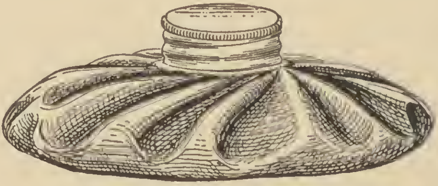


FIG. 7.—Ice-bag (Ashton).

are made of thin rubber, or may be improvised at home by using the dried bladder of a pig or sheep. This makes a very good substitute for the rubber bag.

Into the receptacle place a quantity of ice which has been cracked finely. Do not place too much ice in the

FIG. 8.—Cold Water Coil. The flow of water from the higher to the lower vessel is caused by suction. The flow is started by the use of a piston syringe, inserting the nozzle of the syringe into the end of the outflow tube. The water collected in the lower vessel should be poured back into the upper vessel before this latter vessel is empty. Ice should be kept constantly in the upper vessel.

bag, as it makes it very bulky and heavy, and it becomes a burden to the patient. It is very difficult to get a good ice bag, as most of them will soon leak at their necks. Between the skin and the ice bag a soft, thin woolen cloth should be inserted, to prevent pain and necrosis of tissue—which have followed the neglect of this precaution.

Instead of using ice, ice water may be used, but this method requires frequent changing as the water quickly becomes warm.

Another similar method is that known as the *ice poultice*. Powdered ice is mixed with sufficient sawdust to prevent dripping of water and the mixture is placed in a flannel bag and covered with oiled silk or oiled muslin.

The *cold water coil* is a very good form for applying cold by the mediate process. This consists of a great length of small-caliber rubber tubing coiled in various shapes, depending on the part of the body for which it is to be used. A certain length at either end of the tube is not coiled, one end being used as an entrance for the water and the other as an outflow. The coil is applied to the body, particularly the abdomen, chest, and head, and the inflow end of the tube is placed in a pail of ice water elevated above the level of the body of the patient. The ouflow end is placed in an empty pail on the floor. The water is started flowing by suction on the outflow end. When the upper pail has been relieved of its water it is refilled from the lower pail. (See Fig. 8.)

The *water bed* consists of a large rubber mattress in which cold water is placed and the patient allowed to lie on it. This method is not frequently used.

Immediate Methods.—The use of baths in the treat-

ment of diseased conditions has long been in vogue, and, unlike other forms of ancient therapeutic measures, has not fallen into disuse, but, on the other hand, is being employed more and more as time moves onward.

The *therapeutic indications* for the use of baths are many. There is a false belief among many that the only value derived from the use of cold baths is the reduction of fever. This is entirely erroneous, for, although the lowering of high temperatures by means of cold baths is of great importance, however, it is not paramount. Cold baths are employed for the purpose of reducing fever, quieting delirium, calming restlessness, overcoming insomnia, toning the nervous system and stimulating the vasomotor and circulatory functions. Most authorities do not employ hydrotherapeutic measures for antipyretic purposes until the temperature becomes 103°F. or more. To meet the other indications, cold is employed whenever these conditions are present, regardless of the temperature, unless it be subnormal.

The *forms of baths* are many. Among the most employed forms are the tub bath, bed bath, sponge bath, sheet bath, foot bath, and *sitz* bath.

Tub Bath.—As the name would indicate, this type of bath requires the use of a tub. In hospital practice the portable bathtub, which may be brought to the bedside, is very handy and makes this form of bath less burdensome. In private practice the portable bathtub is in most instances out of the question, and the patient must be made portable, which may prove serious. The first consideration is the transporting of the patient to the tub. With the aid of one assistant this may be easily accomplished with a not too ponderous patient. It must be firmly impressed upon the patient

that he is to exert himself in no way, and is to remain entirely passive. Another method is by placing the patient on a light stretcher while in bed, and carry him to the tub. Some of the portable bathtubs are provided with a stretcher and a frame by which the patient may be easily lowered into and raised from the water by means of a crank. The next point of importance is the temperature of the water. Shall the patient be placed in cold water at once or not? This is a much debated question. The shock due to sudden immersion into cold water is advocated by some physicians as being very beneficial, whereas, others say this shock is detrimental and should be avoided by placing the patient first in warm water and then gradually lowering the temperature of the water. It may be accepted as a safe rule, that patients that are robust and not overwhelmed by the disease from which they are suffering may be placed at once in the cool water. Before bathing debilitated or weak patients it is wise to administer a transient stimulant, as spirit of ether or aromatic spirit of ammonia. The temperature of the water should be 70°F. and should be kept at this point by adding cold water from time to time, or by means of ice in a cloth bag placed in the water. The temperature of the water is raised by the abstraction of heat from the body. It is very important that the surface of the patient's body be constantly rubbed, so as to maintain the peripheral circulation.

Friction of the surface is absolutely necessary, as it prevents chilling and internal congestions, and also aids in more rapid elimination of heat. An ice cap placed on the head will obviate troublesome cerebral congestion.

The patient should remain in the water fifteen or

twenty minutes or until the temperature is reduced to 100.5°F. After the patient is removed from the cold bath the temperature may continue to fall, and if lowered below 100.5°F. by the bath, he may later enter collapse.

When the bath is completed the patient should be gently dried, placed in bed and covered only with a sheet. If chilliness continues for any length of time, a few hot water bottles may be placed around the lower extremities of the patient.

In conclusion let me repeat two maxims: Constant friction or rubbing of the surface is important. Do not reduce the temperature below 100.5°F.

Bed Bath.—This is really a tub bath applied to a patient in bed. It is useful, in that the patient is not removed from his bed, and the results are about as good as those derived from a tub bath.

The bed bath is easily arranged. A rubber sheet of large size is first placed under the patient, then a large blanket is rolled lengthwise, so as to form a large bolster, which is then placed under the side of the rubber sheet and running parallel with the patient's body; a second blanket is arranged as the first but placed under the rubber sheet on the opposite side of the patient; this forms a trough in which the patient lies, the ends of the tub are formed by placing one or two pillows under the ends of the rubber sheet. The pillows at the head of the tub will also act as a support to the patient's head. The tub being complete, water may now be poured into the improvised rubber bathtub. (See Fig. 9.)

It is well to have a cotton sheet under the patient, to prevent the body from coming in contact with the harsh rubber sheet.

FIG. 9.— Bed Bath Arrangement. One corner of the rubber cloth is pulled back to show the rolls of blankets forming the sides of the trough. A sheet is placed on the bottom of the trough to prevent the body of the patient coming in contact with the rubber cloth.

The bath is given in the same way and with the same precautions as a tub bath.

When the bath has been completed the water is removed by taking away a part of the foot pillow and lower end of the side bolster, and thus form a sluice for the escape of water into a pail held under the gate. The rubber sheet is then removed, the patient gently dried and covered with a light sheet.

I consider this form of bath a most excellent one for many obvious reasons. The patient is not disturbed, and the tub may be easily and quickly improvised in any house. If a rubber sheet is not handy, a large piece of table oilcloth will serve the same purpose.

Sponge Bath.—This is one of the most used and beneficial forms of hydrotherapeutic measures. Many practitioners prefer the sponge bath to all other baths and have it used exclusively in the treatment of their fever patients.

A rubber sheet is first placed under the patient, then with a moist sponge the surface of the body is covered with a *thin* film of cold water. If the water is applied in this manner, evaporation, hence heat elimination, results more rapidly than were the patient deluged with water. It is necessary to constantly apply friction to the body surface to maintain the peripheral circulation and to aid evaporation.

In weak and timid patients it may be wise to sponge only part of the body at a time.

It is necessary to sponge and rub the back, for it is here that passive congestions occur, and much heat is stored in the thick tissues of these parts.

Sheet Bath or Packs.—With this form of bath I have

obtained more beneficial results than with the tub or sponge baths in selected cases.

An arrangement similar to the bed bath, but more shallow, may be made, or simply place a rubber sheet or piece of table oilcloth under the patient. The patient is then wrapped in an ordinary sheet from "chin to toes," and sprinkled with cold water until the sheet is thoroughly wet, then rub the patient's body actively. This is important. As the sheet becomes warm, pour on more cold water.

In ten or fifteen minutes the wet sheet and rubber cloth are removed and the patient covered with a light cotton sheet.

Foot Baths.—The uses of this form of bath differ from those discussed above. The foot bath or pediluvium is used principally to influence the circulation of the body in insomnia, headaches and beginning acute diseases, and also as a means of relieving local pains.

The feet, and legs nearly to the knees, are placed in a deep tub of hot water, and more hot water is added as the parts become accustomed to the heat. This soaking is continued for ten or fifteen minutes.

Mustard if added to the water will enhance the action. Use one ounce of mustard-flour to a gallon of warm water.

Sitz Bath.—This form of bath is taken in the sitting (*sitz*) posture and is used to influence the pelvic circulation. It is employed in suppression of menstruation, dysmenorrhea, chordee, etc.

The buttocks are immersed in hot water. A blanket is wrapped about the upper part of the body and draped over the tub, to prevent the loss of heat. The patient remains in this position about fifteen minutes.

Temperature of Baths.—

Hot,	110°F. to 100°F.
Warm,	98°F. to 88°F.
Cool,	88°F. to 70°F.
Cold,	70°F. to 50°F.

Notes on Bathing.—It is not wise to continue a bath more than from twenty minutes to a half-hour. Do not reduce the temperature of a patient below 100.5° F. as collapse may result. Do not wait for the time or temperature limit if the patient become depressed or enters collapse, but remove the patient at once and apply stimulants.

CHAPTER VI

CHILD HYGIENE

The basis of good health of the family, of the community, or of the nation depends not upon the cure of disease but on the prevention of disease.

The prevention of disease must be considered in a twofold manner: First, to hinder ourselves when well from contracting disease from others or outside sources; and secondly, to prevent ourselves when sick from giving disease to others.

The primal instinct of man is self-preservation from injury, infringement and disease; but comparatively few give little thought to guarding their neighbors from disease. For an individual to withstand the incurring of sickness, two fundamental principles are possible: the preparation and development of our bodies and systems so that they may overcome and conquer disease elements, and also by keeping away from or rendering non-dangerous the sources of infection.

The well-developed and rugged child is not so apt to contract illness as the puny child, and if ill has greater chances for recovery. Nearly all children in early age have about the same opportunity for becoming healthy individuals, but many lose this because of environment or lack of care and instruction on the part of the parents.

Nourishment.—The development of the child depends upon the food of which it partakes. Unless absolutely impossible, the food for the first twelve months of the

child's life should be the mother's milk. The natural breast milk should not be withheld from the child on the least provocation but only when it becomes positively imperative. The breast-fed child develops more perfectly, is less liable by a great margin to contract contagious or infectious fevers and has far greater recuperative powers. The digestive system of the breast-fed child, upon which we have to depend so much in sickness, is more likely to be in a healthy and stronger condition.

After the age of twelve months, breast milk should be discontinued; in other words, the child should be weaned. Milk will form the base of diet for some time after the first year, but the introduction of other articles of food is necessary and important. Cereal foods are one of the first innovations in diet. These should be thoroughly cooked, not for ten or fifteen minutes, but for two or three hours. Oatmeal, cream of wheat, farina and hominy in the form of gruels, jellies and later porridge with milk, butter and sugar are very good. Bread a day or two old or, better, zwieback may be given. Soft-boiled egg is an extremely good food, but should be mixed with some other article of diet as zwieback crumbs. Meat juice occasionally is useful. The juice of an orange should be given daily and tends to do much good. The meals should be given regularly and under no conditions should eating between meals be allowed, neither should a child be encouraged in the habit of craving one article of food as crackers, fancy cakes or bread alone. As already mentioned, the meals should be regular, say, for a child under eighteen months of age, five or six daily. As time goes on other articles of diet may be allowed, as meat broths, potato, vegetables,

chicken, puddings, and fruits. Do not feed a child confectionery, cake or pastries. These are not necessary to the child's growth and development and may even be the means of transforming a healthy child into a chronic invalid.

Sleep is essential to the perfect development of the child. During the early days of life, the infant sleeps about seven-eighths of the time, and as time goes on it sleeps less until the end of the first year fifteen hours is sufficient, that is, a twelve-hour night rest and three hours in day naps. Every child up to the age of six years should have day naps.

Air.—Outdoor air and abundant fresh air indoors is absolutely necessary to the well-being of the child. It seems to be the general opinion that a baby or child does not need fresh air. As much time as is feasible should be passed out of doors. A child under one year of age should not go out during cold weather, that is, when the temperature is below 18°F. A child under four years of age should not go out during windy, damp or inclement weather. A child when out of doors should not be allowed to stand in drafty places or sit upon cold stones. When it is impracticable to take children out of doors they should be given the opportunity of indoor airing. This may be done by clothing them as you would for outdoor exercise and then take them into a room with its windows opened and inside doors closed, and there allow them to play for a time. Young infants may be wheeled in a carriage or carried in such a room for a short time, much to their benefit.

Clothing.—The way in which a child is clothed has an important bearing on his or her health. A child should not be overclothed, neither should it be underclad. The

underwear may preferably be of wool-cotton mixture. This affords protection and also prevents undue dampness of the skin which is not healthful. The feet should be well covered, the shoes being made to fit the foot and not the opposite, which often seems to be the case. The condition of the lower extremities is a good index to the general warmth of the body. Cold feet should never be countenanced. The soles of the shoes should be moderately thick and tight, but flexible. It has been truthfully said that "the best chest protector is a good pair of shoes." Enlarged tonsils, repeated "colds" and adenoids are very often directly traced to improper covering of the feet. All parts of the body should be protected; this means the head, legs and chest.

Body Cleanliness.—During the first six or twelve months of life nearly every child receives its daily bath, but for some reason or other, after this period this state of affairs ceases and a weekly bath is generally deemed sufficient. A full daily bath not only removes dirt, infectious material and stale sweat, but also tones the skin, improves its circulation and renders it more potent against external influences, as sudden changes of weather, wind and wet. If the child from early years is given its morning cool bath, it will become a routine procedure and he will look for it as regularly as his breakfast, and enjoy it. A cool bath (75°–85°F.) will be productive of much good to any child except the most delicate, in which case a tepid or warm water bath (85°–100°F.) may be substituted.

In order that a cool bath be effective, it must be followed by a "reaction," that is, a glowing and warmth of the skin. The child may stand in warm water and then be sponged with cool water, after which the skin is

vigorously rubbed with a soft towel to bring about the "reaction." If instead of glowing the skin takes on a blue tint and the child complains of being cold, it is a sure indication that cool baths should not be given, but rather a warm wash.

Under this heading it will not be out of place to refer to the condition of the bowels. In nursing or bottle infants two or three bowel movements daily are normal and in older children a daily movement should occur. Insufficient bowel evacuation is a fertile cause of ill health and the condition should be remedied. Regular habit is the best means of correcting this state of things. Daily at the same time, preferably after breakfast, the child should be compelled to go to the stool whether he has the desire or not, and try for ten minutes to bring about the desired effect. A small enema of warm water may at times be necessary to stimulate the bowels to act.

We have considered that one way to prevent ourselves from taking disease is to perfectly develop our bodies. Another way is to prevent coming in contact with disease. Contagious and infectious fevers are spread by contact. During epidemics children should be taken in street and railroad cars as little as possible and never in crowded places, as stores, theaters, moving picture shows and such places. A child should be taught never to place in its mouth objects which other children have had, as lead pencils, gum, and fruit. Kissing of children and babies promiscuously is an abomination, if not a moral crime. Many an innocent babe or child has sacrificed his life for this so-called social act. Diseases of all kinds have been spread by this means. The use by a child of strange playthings is not without danger. The writer has known scarlet fever to be spread months

later because an innocent child played with toys which were used by a scarlet fever convalescent weeks before.

The contagious diseases usually gain entrance through the mouth and nose. The tonsils, especially if diseased, are the main factors. The mouth and teeth should be cleansed once or twice daily. Diseased tonsils if they exist should be attended to.

Isolation and Quarantine.—Infectious and contagious are expressions often used incorrectly or are misinterpreted. A contagious disease is one transmitted from person to person by direct touch or contact. An infectious disease is one dependent upon an infective agent as a germ. It will be much better to eliminate both of these terms and use the word communicable. This will convey more exact information and may be applied to all diseases capable of being transmitted from person to person by direct means or through an intermediate agent. If a communicable disease enters the home, your first duty to the community and neighbors is to protect them from infection. You should bear in mind that the form of scarlet fever or measles which your young patient has is no different from the same disease in others, and is just as contagious. Why is it you and others are so opposed to quarantine (especially or only when applied to your own home)? Why do you and others feel that your liberty and rights as citizens are being infringed when your home is quarantined? Do you think scarlet fever, measles, whooping cough and other like diseases are of a trivial nature? If so, let me tell you that in the year 1911, in New York state there died of scarlet fever over 1147, of measles over 977, of whooping cough over 816, of diphtheria over 1961. It will be granted that nearly everybody will submit to quarantine for smallpox, yet in

one year in New York state there were 1144 more deaths from scarlet fever than from smallpox. I ask you to place a few moments of sound thought on this subject. Think what it would mean to the community, state, nation, or even yourself and family if contagious infects were allowed rampant. Help your local health authorities all you can. They are not toiling for themselves but for you. Today your home may be invaded by measles and you may not wish to be quarantined; tomorrow your neighbor may contract smallpox and you will want them quarantined. It is necessary to isolate both diseases, for, in fact, more die of measles than smallpox in a given time in this country.

As soon as a member of the family is taken with a communicable disease he should be isolated from the rest of the family in a clean, light, well-ventilated room. All intercourse between the patient and others of the family should cease. The room should be prepared as subsequently explained. Nothing which comes in contact with the patient should be used by others until freed from infection.

As nearly all the excretions and external secretions from patients ill with infectious disease are capable of infecting others, it is necessary that they be rendered non-dangerous. The *bowel movements and urine* may be made innocuous by adding to them a small quantity of a five per cent. carbolic solution or a 1 to 500 solution of bichloride of mercury. Or you may mix with them a quantity of chlorinated lime, or even quick or unslaked lime. Then allow the whole mixture to stand an hour before throwing out. *Excretions from the nose and mouth* may be received in small pieces of cloth or paper and immediately burned, or they may be deposited in a

cup containing a five per cent. solution of carbolic acid and later thrown out. This latter method is not absolutely safe, as the patient may by mistake or while stupid get some of the poison. The *hands* may be rendered free from poison by immersion in a 1 to 1000 solution of bichloride of mercury. The *bedclothing*, towels and linen should be first made safe before sending them to the laundry. This may be done by soaking them for three hours in a five per cent. solution of carbolic acid. *Dishes* used by the patient may be kept in the sickroom and there washed, but before returning them to the general pantry at the completion of the illness they should be thoroughly boiled. When quarantine is about to end, the sickroom must be disinfected.

CHAPTER VII

ALLEVIATION OF SYMPTOMS

In this section the medicinal or drug treatment of disease will not be considered, it being left to the discretion of the attending physician. Only such treatment will be discussed as a nurse may employ in the absence of the physician. Not only symptoms but also some of the complications will be given attention.

Bed sores occur in all diseases in which prolonged rest in bed is necessary. They are very common in some diseases, especially typhoid fever.

They are due to interference with the circulation, as the result of pressure, and hence the nutrition of the skin is cut off, a sore resulting. They occur most frequently over the bony prominences. Moisture acts as an exciting agent; also hard particles on the sheets, such as crumbs. Creases in the bed clothing and depressions in the mattress tend to aggravate the sores.

The treatment of this common occurrence is two-fold: preventive measures, curative measures.

Preventive measures must, of course, be used before the formation of the sores. Cleanliness is paramount, and frequent changes in the position of the patient are essential. Do not allow a patient to lie too long in any one position. A change of position is restful.

Hardening of the skin is a most important preventative. This is augmented by bathing those parts of

the body where bed sores are usually formed, with various hardening and astringent solutions. Dilute or full strength alcohol (not absolute alcohol) are very good agents, or a solution consisting of whiskey and common salt (1 to 753). Vinegar is very useful. A simple and handy way is to take a slice of lemon and rub this over those parts that might be affected, repeating daily. This will prevent bed sores, when other methods fail. Solutions of alum and tannic acid have been used.

Curative Measures.—After sores have formed active treatment is necessary. The sores should first be thoroughly cleansed with a solution of peroxid of hydrogen or bichlorid of mercury (1–5000) and then dressed dry with some dusting powder, as bismuth subnitrate, aristol, or stereate of zinc. If the sores show signs of indolency, touch them with a stick of silver nitrate and dress with ichthyol or balsam of Peru.

Bronchitis.—In those diseases accompanied by irritative conditions of the throat and bronchial tubes it is often necessary and agreeable that the air of the sick room be moistened. It is not advisable to steam the whole room but only that about the patient. To confine the steam to this locality a tent is constructed. By fastening a stick five feet long to each corner of the crib or bed a sheet may form the roof and others the three sides, one side being left open. Steam is then conducted into the tent from a croup kettle or other improvised generator. Have the steam enter at the end opposite the patient's head. Oftentimes a medicated steam is more useful than plain watery vapor. Creosote, compound tincture of benzoin or oil of eucalyptus may be added to the water.

Constipation is the rule in most febrile diseases and

is due to numerous causes, among which are the prolonged rest in bed, the diet of milk, and in some cases the medication.

The constipation is best relieved during the acute course of the disease by means of enemata, of which there are several kinds. (For the composition of enemata see that section in the Addenda.)

Convulsions occur frequently in children ill with infectious fevers. The very best and rapid method of overcoming convulsions is to place the child in a hot mustard bath. If the child's temperature be very high, this may be the cause of the convulsion. Then cold water may be poured over the child while in the bath. If there be any reason to believe the attack to be due to meningitis, apply ice to the head.

An enema should be given if the child were previously constipated.

Diarrhea may be very troublesome, especially in typhoid fever. Most authorities say that when the movements of the bowels number more than six in one day, active treatment should be begun.

In many cases diarrhea can be controlled by applying a mustard plaster to the abdomen. In some instances it may be necessary to wash out the lower bowel by means of a normal saline solution. A rubber tube or catheter of large caliber is introduced high in the rectum and the solution allowed to flow in from a fountain bag. Free exit for the returning solution must be provided by the introduction of a second catheter of smaller caliber than the inflow one.

Ice water injections have been advocated by some but should be reserved for very strong individuals.

Starch and laudanum enemata. (See Addenda.)

Delirium occurs in two forms—the *active* and the *low muttering forms.* In the former the patient becomes more or less maniacal and wild. This is rare in the infectious fevers, and as a rule the patient is one who has been addicted to the use of alcoholic beverages.

The active form is combatted by powerful sedative drugs. The low muttering form of delirium is best treated by hydrotherapeutic measures, as baths, packs, etc.; also by alcoholic stimulation.

Disorders of the Tongue and Mouth.—In all cases of febrile disease careful attention should be paid to the mouth, tongue, and teeth. The latter should be kept thoroughly clean. The mouth is to be cleansed several times daily by swabbing it with cotton or gauze wet with some antiseptic solution. A very useful solution consists of glycerine, 5 parts; lemon juice, 1 part; hydrogen peroxid, 5 parts; water, 25 parts. A solution of boric acid or borax may be used or a diluted solution of hydrogen peroxid.

Fever.—See special chapter.

Headaches are very common in the onset of all infectious fevers, and are very annoying to the patient. An ice bag applied to the head will relieve the majority of headaches. A cold bath or pack are useful in some instances. If the bowels are constipated, an enema will be of great service. A mustard foot bath often gives good results.

Hemorrhage from the Bowels.—This occurs as a complication of typhoid fever in over four per cent. of cases. It is a serious occurrence and demands prompt and active treatment. The signs and symptoms of intestinal hemorrhage are discussed in the chapter on Complications.

The attending physician should be notified at once. In the meantime apply an ice-bag to the right iliac region of the abdomen; stop all nourishment by mouth and enforce absolute quiet. Prepare for giving a hypodermic of morphine in case the physician might wish it; also get the apparatus and solutions ready for giving a hypodermoclysis.

Hemorrhage from the Lungs.—In pulmonary disease, especially in ulcerative tuberculosis of the lungs, hemorrhage is of somewhat frequent occurrence.

The treatment is similar to that for hemorrhage from the bowels. Place an ice-bag on the chest and prepare for a hypodermic of morphine, and for a hypodermoclysis if the bleeding has been profuse.

Hemorrhage from the nose or epistaxis may be very severe and persistent in typhoid fever and other infectious fevers. It is best combatted by first applying warmth to the feet by means of hot water bags or a hot mustard foot bath. Hot water bags should also be applied to the back. Ice, or cloths which have been on ice, are applied to the root of the nose. Spray or douche the nose with vinegar or diluted lemon juice. Douching the nose with very warm saline solution is as useful as any method.

Insomnia is a frequent and very troublesome symptom of the infectious fevers. If the temperature be high, a sponge bath with cool water or an alcohol rub will relieve the feverishness, quiet the nervous system, and be productive of good results. At times a sponge with tepid or warm water will be more useful than with cool water. A hot foot bath or hot water bottles applied to the feet are also good. An ice-bag to the head may be used in conjunction with this method, or alone.

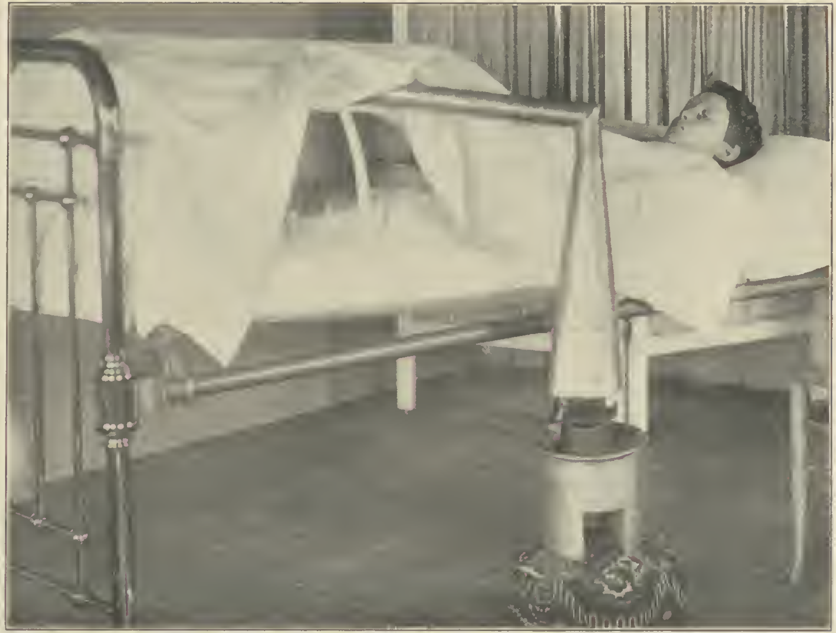


FIG. 10.—Hot Air Bath Arrangement. Part of covering blanket is raised to show the arrangement of the apparatus.

In many cases a hot drink before the hour of sleep will aid in the production of sleep.

Nephritis occurs often as a sequel of scarlet fever and erysipelas (see Complications) and is of grave import. The indications are to restore the functionating powers of the kidneys and to relieve them of part of their duties. This latter is obtained by increasing the elimination of water by the skin and bowels.

Increased elimination of water by the skin is brought about by augmenting the excretion of sweat. The patient should be placed between blankets with plenty of hot water bottles about him. Sweating may also be increased by giving the patient a hot air bath. Introduce under the blanket in which the patient is wrapped the end of a tin pipe, the other end of which contains an alcohol lamp placed on the floor. (See Fig. 10.) If sweating does not occur, it may be hastened by administering a drink of cold water.

When applying heat to an extensive surface of the body it is well to have an ice-bag on the head to prevent cerebral congestion or heat stroke.

Plenty of water must be introduced into the system, as this aids in the return of power to the kidneys and also flushes them of irritating material and toxins. Water may be introduced by drinking or by saline infusions per rectum or by hypodermoclysis. The bowels should be moved by the aid of calomel or epsom salts.

Hypodermoclysis, or literally, an injection under the skin, is one of the most useful procedures in the treatment of certain serious and grave conditions.

The liquid injected is a watery solution of common salt, of a determined strength, and is known as a physiological salt solution, normal saline solution, normal

salt solution and isotonic salt solution. This solution is a 0.6 per cent. to 0.9 per cent. solution of salt (sodium chlorid) in water, and is so called because it is of the same saline strength as human blood serum. This solution is prepared by adding one and one-half drams of common salt to one quart of water. The solution must be sterile. A more convenient method is to have on hand a sterile, concentrated salt solution, and prepare the injecting fluid by adding a small amount of the concentrated salt solution to one quart of sterile water. The concentrated solution is prepared by dissolving six ounces of common salt in one pint of water and thoroughly sterilizing it. One-half ounce of this solution added to one quart of sterile water will produce a normal salt solution.

The introduction of normal saline solution into the system restores the blood serum to the normal amount, tones the vasomotor system, stimulates the heart, amends the body heat, aids in the elimination of toxins and deleterious material through the skin and kidneys.

The *indications* for the employment of hypodermoclysis are *cardiac failure*, especially when accompanied by vasomotor disturbances, as in shock, collapse, ether and chloroform narcotization, post-operative shock, depressions during acute diseases, as pneumonia and typhoid fever. *Loss of body fluids*, as in severe hemorrhages and exhausting diarrheas, and in post-operative thirst. *Toxemias* and disease characterized by circulating poisons, uremia, etc. *Nephritis* accompanied with anuria.

Method of Procedure.—Various forms of apparatus have been devised with which a saline injection may be given. A simple, inexpensive and readily obtainable apparatus consists of a quart glass funnel, a piece

of rubber tubing and a fair-sized aspirating needle; or a fountain rubber bag, with its tubing, and an aspirating needle may be employed. This apparatus should be used for no other purpose. The outfit must be absolutely sterile before being used.

The normal saline solution, which should be sterile and at a temperature of 103° F., is poured into the glass funnel; a stream of the solution is allowed to run from the needle until all air is removed from the tubing and the solution has warmed the apparatus. Between the thumb and index-finger of the left hand raise a fold of the patient's skin at the site for the injection, preferably below the breasts, the side of the abdomen or inner part of the thigh, and with the right hand thrust the needle point through the skin at the base of the fold into the loose subcutaneous tissues. The funnel is elevated about three feet above the patient, and the solution allowed to enter the tissues. As the parts begin to swell, they should be gently rubbed, to diffuse the solution and aid in its absorption.

After one and one-half pints of the solution have entered the tissues the needle is withdrawn and a small piece of adhesive plaster applied to the area.

It is often necessary to repeat the injections one or more times. The author has witnessed most excellent results from the regularly repeated saline injections.

Enteroclysis.—The injection of large amounts of fluid into the bowel has long been in vogue. It is a highly useful method of supplying fluid to the body after severe hemorrhage, persistent diarrhea, post-operative thirst, and when it is not practicable to give water by mouth, in certain stomach disorders.

In certain forms of nephritis, when the kidneys are

excreting but little urine, enteroclysis of normal saline will often produce very good results. In toxemias, diabetic coma, uremia, gas poisoning, acute infectious diseases and all conditions characterized by circulating poisons, enteroclysis of normal saline will dilute the poisons and aid in the elimination. A patient suffering from severe toxemia was placed under my charge, in a moribund condition. I immediately began to irrigate the bowel with normal saline solution, and was soon gratified by an improvement in the patient's condition, which slowly continued until full return to consciousness resulted. In six hours I used over fifty gallons of saline solution.

In intestinal diseases, such as dysentery, cholera and infantile enterocolitis, enteroclysis of medicated solutions is most beneficial.

In infantile diarrheal conditions, washing of the lower bowel will give most gratifying results.

Method of Procedure.—The saline solution is prepared as described under Hypodermoclysis. The apparatus used is the same, excepting that the aspirating needle is replaced by a double-flow apparatus of some kind. A double-flow arrangement which I have found of much service is known as the Martin rectal irrigator. The inflow tube is connected with the rubber tubing from the funnel or fountain bag, and the outflow tube is connected with a piece of rubber tubing leading to a waste pail.

When it is desired that the injection be given high in the bowel, a long double-flow tube may be easily improvised. A rubber rectal tube with an open end, as well as a side eye, and a small-caliber soft rubber catheter are necessary. The catheter is passed through the rectal

tube until the eye of the catheter projects just beyond the end of the rectal tube, and is here secured with a stitch of silk. The catheter serves as the inflow tube and the rectal tube as an outlet.

When employing enteroclysis on a child or infant, use a soft rubber catheter instead of a rectal tube, and secure sufficient outlet.

The temperature of the solutions used should be about 100° F.

Rectal Drop Infusion of Saline Solution.—This is the introduction into the rectum of a salt solution drop by drop. It is one of the most useful procedures in child nursing. It is indicated whenever the excretion of water by the system is too slow as in certain forms of kidney troubles which often occur during the acute contagious diseases of childhood. Also in certain forms of heart depression it is very necessary. To give it a regular rectal fountain syringe outfit with a very small nozzle is employed. Around the rubber tubing leading from the bag a string is so tied that the water flows from the nozzle in drops (not in a stream). The warm solution (99° F.) is placed in the bag and the nozzle is lubricated with vaseline and introduced into the rectum. It should take about one-half hour to instil one pint of solution. The solution generally used is prepared by adding a level teaspoonful of common table salt to three cupfuls of water. When properly given, very little or no solution escapes from the rectum, but is absorbed about as fast as it drops in.

Pains in the back are very troublesome in influenza. The application of strong mustard paste, hot water bags, or an ice-bag are useful.

Pains in the joints are the most annoying symptoms

in rheumatism. The applications for local control of joint pains are varied and numerous. Every physician, nurse, and housewife has many original painkillers. The following are a few of the many and are the best:

A very good application consists in oil of gaultheria, one ounce; salicylic acid, one dram, and cotton seed oil, twelve ounces. Apply to joint and cover with soft woolen cloths and oiled muslin.

A mixture of equal parts of guaiacol and glycerin applied as above is very useful. Ichthyol, either pure or as a fifty per cent. ointment. Hot cloths saturated with the lotion of lead and laudanum. Chloroform liniment is good.

A most excellent method is the application of an ice-bag. The mention of this is disagreeable to the patient, but after a few minutes' application the pain becomes easier and the patient more comfortable.

A method used by some physicians is to make woolen bags and place a moderate amount of powdered sulphur in each and draw them over the affected limb and shake them so that the sulphur gets over the surface of the limb. Allow the bags to remain on for a few days. This method acts better in the subacute cases.

Peritonitis.—The application of a light ice-bag to the abdomen is the best.

Pleurisy or "Stitch in the side," when it occurs, is very annoying to the patient. A hot water bag or a mustard plaster placed over the area will generally give relief. An ice-bag is fully as good as the hot water bag, and in many cases it produces the best of results. The application of an ice-bag is repulsive to most patients but as they soon learn the great results

obtained from its use they do not object after the first application.

Tincture of iodine painted over the area of pain is very useful. A belladonna plaster does good in some cases.

Retention of urine is not of uncommon occurrence in the acute febrile diseases, and should not be confused with suppression of urine. In the former the kidneys may be performing their functions normally and secreting the proper amount of urine which is collected in the bladder, but the patient is unable to pass it from this viscus; but in suppression of urine the kidney function is disturbed and little or no urine is secreted, and the bladder remains free from urine. This latter is a very serious condition.

Before resorting to the use of a catheter in urinary retention, other simpler means should be employed. Ofttimes retention is of nervous origin, the patient being unable to pass urine if the nurse or other person remain in the room, but readily accomplishes the act if left alone in the room. The sound of running water from an open faucet often helps; the application to the lower abdomen and genitals of cloths wrung out in hot or cold water is often successful in starting the flow of urine. Placing hot water in the bedpan, so the steam reaches the parts, will sometimes aid. When all simple means fail, resort to the catheter is obligatory. Of catheters there are two kinds, the rigid and the flexible. The rigid are made of metal or glass, and the flexible of soft rubber or webbing.

In catheterization, two things should be ever kept in mind: The catheter must be sterile; the patient's parts and the nurse's hands must be clean. Rigid catheters are sterilized by boiling, and the flexible catheters are

rendered sterile by immersing for twenty minutes in 1-1000 bichloride of mercury solution, and thoroughly rinsed with sterile water before using.

The parts of the patient are cleansed with soap and warm water and then swabbed with strong boric acid solution.

Catheter fever and cystitis may result from improper catheterization.

If the bladder is greatly distended with urine, it should be only partially emptied, as complete removal of the urine may bring about collapse.

Sore throat is troublesome in some of the infectious fevers, especially in scarlet fever and diphtheria. External applications to the throat of heat and cold, especially the latter if the patient will submit to it, should be used.

For internal use, that is, as gargles or for swabbing the throat, the following are useful: Hydrogen peroxid solution (1 to 3). Solution of boric acid (1 to 25). Tincture of chlorid of iron one dram, glycerine one ounce, and water to two ounces.

Sweating of a profuse type occurs in some cases of typhoid fever, usually due to exhaustion or sepsis; in tuberculosis pulmonalis and acute rheumatism. Sponging the body with the following solution is very good: Alum one-half ounce, alcohol two ounces, water sixteen ounces.

A wash of vinegar or of one dram of sulphuric acid to one pint of water, is often valuable.

Tympanites is especially prominent in typhoid fever. The abdomen sometimes reaches a great size, and the tympanites becomes a very serious complication.

Intestinal antiseptics administered by mouth aid

greatly in decreasing the distention. Of all drugs used turpentine stands in the first rank. It should be used internally and externally.

Externally it is used in the form of stupes. For instructions on making these see the article on Topical Applications. A turpentine enema is of very great help in expelling gas. (See section on Enemata.)

Turpentine used externally is absorbed to a certain extent and a continuous use of it may be followed by toxic effects. Careful watch must be kept to detect the onset of poisonous symptoms. Turpentine is irritating to the kidneys, and the urine is a means of detecting its ill effects. The odor of the urine becomes like that of violets; later the urine may become cloudy and bloody. Cyanosis may occur. In many persons it will cause a diffuse, red eruption of the skin.

Asafetida is very useful in aiding the escape of flatus, if given as an enema. (See Enemata.)

Vomiting is a very distressing symptom and at times it seems almost uncontrollable. In many of the most severe and protracted cases simple measures have brought about the best results. An ice-bag placed on the back, epigastrium, or nape of the neck is of service. A mustard poultice over the epigastrium works marvels. Cracked ice with whiskey or champagne is beneficial. Lime water added to the milk relieves the stomach in many instances.

Inhalations from a cloth wet with vinegar, a starch and laudanum enema, and washing of the stomach (in selected cases) are useful.

In some cases it will be necessary to temporarily stop feeding by the mouth and to rely on rectal alimentation. (See Enemata.)

Shock and Collapse.—Below is given a tabulated arrangement for the application of remedial measures to overcome shock and collapse.

Elevate the feet and lower the head.

Apply warmth by means of blankets and hot water bags.

Give diffusive stimulants, as aromatic spirits of ammonia, spirits of ether, whiskey or brandy.

Give stimulants by hypodermic, as strychnine, atropine, nitroglycerine, digitalin, and suprarenal solution.

Amyl nitrite by inhalation is very useful in some cases.

Saline solution subcutaneously or by rectum.

Rectal injections of a cup of strong, black coffee are good.

CHAPTER VIII

DETECTION OF COMPLICATIONS

During the course of the infectious fever, complications are not only frequent, but in many instances increase the gravity of the primary disease. They may occur during any stage of the disease, from the invasion to convalescence. An early knowledge of the onset of complications is important, and their detection is only accomplished by continued and careful study of the patient's condition. A great part of the burden is dependent on the nurse in attendance, as the complications generally make their appearance during the absence of the physician.

The more common complications of each of the infectious fevers are classified, and then the more important complications are discussed in detail.

Typhoid Fever.—Intestinal hemorrhage, intestinal perforation, bed sores, severe bronchitis, phlebitis, grave delirium, excessive diarrhea, cholecystitis, bone lesions, pleurisy, pneumonia and septicemia.

Smallpox.—Laryngitis, bronchopneumonia, albuminuria, myocarditis, otitis media and iritis.

Scarlet Fever.—Nephritis, arthritis, endocarditis, otitis media, meningitis, pericarditis, pleurisy and convulsions.

Measles.—Bronchopneumonia, otitis media, laryngitis, severe bronchitis, paralysis, pleurisy, diarrhea and convulsions.

Mumps.—Meningitis, nephritis, arthritis, orchitis, ovaritis, facial paralysis and otitis media.

Whooping-cough.—Pneumonia, nephritis, convulsions, hemorrhages into the skin, conjunctivæ and from the nose and bronchi.

Influenza.—Pneumonia, pleurisy, meningitis, neuritis, nephritis and nervous disorders.

Cerebrospinal Meningitis.—Pneumonia, arthritis, paralysis, nephritis, pericarditis, endocarditis and otitis media.

Lobar Pneumonia.—Pleurisy, edema of the lungs, pericarditis, meningitis, delirium, convulsions and empyema.

Diphtheria.—Paralysis, endocarditis, pericarditis, pneumonia, nephritis, severe bronchitis, arthritis, otitis media and abscesses.

Articular Rheumatism.—Endocarditis, pneumonia, pleurisy, delirium, meningitis, purpura and convulsions.

Erysipelas.—Pneumonia, endocarditis, delirium, pleurisy, meningitis, pericarditis and septicemia.

Important Complications

Arthritis may occur during the course of any of the acute infectious fevers, particularly in scarlet fever, diphtheria, cerebrospinal meningitis and typhoid fever. Any of the joints may be affected. The severity of the arthritis varies exceedingly. In scarlet fever I have seen instances of involvement of the shoulder joint which disappeared in eighteen hours, although at a previous visit the symptoms seemed almost unbearable. Cases of arthritis of the hip joints following typhoid fever, which completely destroyed the joint. The inflammation may be of the simple serous type or may be suppurative and destructive. One or more joints

may be involved. The disease may manifest itself with swelling and redness of the parts and great pain and tenderness.

Bed sores may occur during any acute infectious disease which prostrates the patient, or during the course of which the patient is required to remain in bed for a protracted time. Bed sores occur frequently in typhoid fever. Bed sores result from pressure or disease of the nerves or cord. Pressure acts as an exciting cause in two ways—by mechanical damage of the tissues, or by interfering with nutrition and blood supply of the part. The sores first appear as red, glossy areas over bone prominences, as the sacrum, ilia, or heels, and may be prevented from entering the second stage by removing the cause, by the use of astringing and hardening lotions and by hydrotherapeutic measures (see Chapter VI). Soon the continuity of the skin is destroyed and an abrasion results, which passes into the ulcerous stage and may become quite extensive.

Bronchitis of a severe type is not an uncommon complication of typhoid fever, measles and diphtheria. In typhoid fever this complication is troublesome because of the cough, which, when very severe, may urge intestinal hemorrhage. Bronchitis, when complicating one of the acute fevers, is recognized by the cough, which at first is tight and painful, and later accompanied by more or less profuse expectoration. The fever of the primary disease may be greatly exaggerated by the advent of bronchitis. Chills or chilly sensations are frequent.

Convulsions occur very frequently in the acute infectious diseases affecting children, as pneumonia, scarlet fever, measles, whooping-cough and influenza. In adults convulsions may vary from a slight twitching of

one member to a general convulsion resembling the epileptic seizure with the glottic spasm, rolling eyeballs, clenched hands, stiff neck, etc., terminating in unconsciousness.

Delirium may occur in any of the acute infectious fevers, and is frequent in typhoid fever, pneumonia, erysipelas and rheumatic fever. Delirium is met with in two forms—the quiet, low-muttering form, and the loud, active form. In typhoid fever the delirium, as a rule, is of the low-muttering type. The patient becomes apathetic and semi-conscious, and will pick at the bedclothes (carphologia) or attempt to catch imaginary bodies. The patient may lie unconscious with the eye staring, fixed upon one object (coma vigil). In rare cases of typhoid fever the delirium may be of the active type, the author having seen cases in which the patient was very restless, later becoming active, wild and noisy, and tried to escape by throwing himself through a window.

Delirium in pneumonia may be of either type, and in patients accustomed to alcoholic beverages it may become of the character of delirium tremens (mania a potu). Delirium is not uncommon in rheumatic fever, and may be due to high fever, the action of the toxines on the nervous system or to the administration of the salicylates (see Chapter XX).

Diarrhea.—Diarrhea of an excessive and exhausting type ceases to be a symptom and becomes a complication. In typhoid fever especially, and sometimes in measles, this complication is met. Excessive diarrhea exhausts and weakens the patient and prolongs convalescence.

Edema of the lungs may occur as a complication

in pneumonia or as an antemortem phenomenon in any acute infectious fever which has run a severe, exhausting and prolonged course. The advent of pulmonary edema in pneumonia is of very grave significance. The sputum takes on particular character. It becomes thin, watery, profuse, pink or blood stained and is frothy. Dyspnœa and cyanosis become extreme, the facial expression becomes very anxious, the pulse very rapid and feeble, and collapse may soon follow.

Endocarditis.—The toxines formed during the course of the acute infectious fevers seem to have a peculiar affinity for, and to be capable of injuring, the cardiac tissues. In scarlet fever, rheumatic fever, erysipelas, cerebrospinal meningitis and pneumonia cardiac complications are not uncommon. Endocarditis may be present without symptom or sign; at other times it may be detected only by the physical signs. Subjective and objective symptoms may be present as an exaggeration of the fever, rapid and irregular pulse, palpitation of the heart, precordial discomfort, difficult breathing and prostration.

Intestinal Hemorrhage.—This complication is frequent in only one of the acute infectious fevers, namely, typhoid fever. In the first 137 cases of typhoid fever occurring in the Samaritan Hospital which I tabulated several years ago, I found ten cases of intestinal hemorrhage (seven per cent.). The bleeding may vary from only a slight oozing to a profuse hemorrhage. The appearance of the stool is not always a true index of the severity of the hemorrhage. A severe hemorrhage may take place, and yet the blood will not appear in the bowel movement for some time. Bleeding occurs most frequently during the third week of the disease, at which time the sloughs

of the intestinal ulcers are separating. Intestinal hemorrhages usually occur insidiously, without premonitory symptoms. I have had my attention called to a danger signal which is said to occur previous to intestinal hemorrhage, *i.e.*, continued paleness of the face. I have not observed this sign in a sufficient number of cases to place credence on it. The usual symptoms of intestinal hemorrhage are rapid fall of temperature, cutaneous and mucous membrane pallor, cold extremities; small, feeble and rapid pulse, and, in severe cases, general collapse. It should be remembered that the blood does not always make its appearance during the stage of active hemorrhage.

Intestinal Perforation.—Although a rare complication, it does occur in typhoid fever. Of the 137 cases of typhoid fever referred to in the section on intestinal hemorrhage, two were complicated with intestinal perforation. This complication is of very grave significance, only a very few recovering. It is ushered in by sudden and very severe pain in the abdomen, and the signs of collapse, fall of temperature to a low point, and a rapid, feeble pulse. Great distention of the abdomen predisposes perforation.

Nephritis is a frequent complication of the acute infectious fevers, especially of scarlet fever, diphtheria, erysipelas, cerebrospinal meningitis and influenza. In scarlet fever, kidney complications seem most frequent in the latter part of the third week. The disease manifests itself by a diminution in the amount of urine voided. The urine is of a high specific gravity, dark in color (it may be of a "smoky" or "briny" color) and contains much albumen. There is usually edema of the skin, appearing first in the lower eyelids, and may

later become general. Lumbar pains, vomiting and signs of gastro-intestinal disorders may occur. In the severe cases uremic signs are apt to be manifest.

Otitis media, or middle-ear disease, may complicate scarlet fever, diphtheria, cerebrospinal meningitis, measles and mumps. The affection is characterized by ringing in the ears, dizziness, difficulty of hearing, pain, discharge and febrile disturbance.

Paralysis.—Various forms of paralysis may complicate the acute fevers. In diphtheria they are not infrequent. Paralysis of the muscles of the palate is common and causes regurgitation through the nose of fluids and small particles of food on attempting to swallow. A characteristic nasal twang is produced. Paralysis of other muscles may occur—as the facial, ocular, laryngeal, humeral, etc. In cerebrospinal meningitis, not only may the muscles of the eye, tongue and larynx be paralyzed, but even the arm or the whole of one side of the body.

Pericarditis may occur in scarlet fever, pneumonia, erysipelas, rheumatism and cerebrospinal meningitis. The onset of pericarditis does not depend on the extent or severity of the primary disease. The author has reported a fatal pericarditis with effusion complicating a mild case of pneumonia with consolidation no larger than a silver dollar. The signs of pericarditis are exaggeration of the fever, precordial distress, cough, difficulty of breathing, palpitation and a rapid, weak pulse.

Phlebitis and the formation of thrombi in the veins occurred in four of the 137 cases of typhoid fever referred to above. In one instance it formed on the sixty-sixth day of the disease. There is pain and tenderness

at the site of the phlebitis, and the vein may feel like a hard cord. The parts below become swollen and edematous. The thrombosis occurs, as a rule, in the left femoral vein. If the artery is involved, gangrene will likely follow.

Pleurisy in pneumonia should be considered as a symptom rather than a complication, for it occurs in all cases where the surface of the lung is involved. As a complication it is seen in rheumatic fever, influenza, typhoid fever, measles and scarlet fever. Signs of the onset of pleurisy are sharp, stabbing pain in the chest, especially when coughing or taking a deep breath, chills or chilly sensations, suppressed, dry cough and dyspnœa.

Pneumonia, when complicating the infectious fevers, is usually of the catarrhal or bronchial type, and is encountered most frequently in erysipelas, influenza, measles, rheumatic fever, whooping-cough and cerebro-spinal meningitis. Pneumonia is a very serious complication, and when affecting a debilitated person suffering from one of the acute fevers it is very apt to prove fatal. This is especially the case in measles. The onset of this complication is accompanied by irregular, high fever, great prostration, cough, cyanosis, difficult breathing, chills and a very rapid pulse.

It may be said that when one disease complicates another, the course of the complicating disease is not only often irregular, but may be completely concealed by the primary disease.

PART II

SPECIAL DISEASES

CHAPTER IX

TYPHOID FEVER

Synonyms.—Enteric Fever, Abdominal Typhus, Autumnal or Fall Fever.

Etiology.—The causes of typhoid fever are divided into two classes—predisposing and exciting.

The onset of an acute infectious disease depends on two factors, namely, the resistance of the individual and the virulence of the bacteria and their products. If the resistance of the person be lowered by exposure to cold and damp, to poor food, etc., then the specific bacteria, if they gain entrance to the body or are present in the body, can easily propagate because the resistance or vitality of the person is not great enough to stand the attack of the micro-organisms; consequently disease ensues. On the other hand, if the resistance of the individual be high, that person may even withstand the attack of very virulent germs.

If no germs of a certain disease are present or if they do not gain entrance to the individual, no matter how low his resistance may be he will not contract that disease.

The onset and severity of the course of an acute infectious disease depend on the degree of resistance

of the person and the virulence of the infective micro-organisms.

The *predisposing causes* of typhoid fever are Fall season and adult life—typhoid fever occurs but rarely in the very young or aged. Males and females are about equally susceptible.

The *exciting cause* is the bacillus of Eberth and Koch, or the Bacillus Typhosus. This bacterium has great powers of resistance. The bacillus retains its vitality for some time even if heated to 140° F. (dry heat), but will not withstand the same amount of moist heat. It lives even in ice.

The bacilli gain entrance to the body in many ways, but the principal means of ingress are by food and drink. Drinking water probably forms the most frequent mode of entrance. The small creeks and streams leading into the water-supply of cities are often a source of infection. These small streams derive their virulence from contamination with the excreta of infected persons. The excretions, even if thrown on the ground or buried some distance from the stream, are dangerous and may contaminate the water by percolating through the ground or being washed in by heavy rains or by the freshets in the spring.

Ice taken from ponds or places contaminated with the bacilli is dangerous. Food infected by polluted hands, or by infectious material carried by flies and insects is a source of the disease.

Vegetables and fruits handled by unclean hands or washed with contaminated water are another source. Milk derives its infective character from polluted hands, or from infected water used either to adulterate the

milk or to clean the pans and cans into which the milk is placed.

Oysters are said to be a carrier of the infection. They derive their virulence from sewage which is deposited into the water near the oyster beds. Clothing and bedding become contaminated by drying dejecta. Human beings may act as bacilli carriers, and many instances of such have been recorded in medical literature. After an attack of typhoid fever the germs may be found in the bowel movements and urine for months, even years, and thus the individual becomes a menace to public health for a prolonged time. Other persons who themselves have never suffered an attack of typhoid fever, but have been in contact with the patients, may retain the bacilli and impart the disease to others. Flies are found to be a frequent means of disseminating the disease. This has been repeatedly demonstrated to be the case, especially in the Hispano-American conflict, when flies would travel from the excretion trenches to the cook tents and kitchens, thus infecting the food of the troops.

From what has been said of the cause of typhoid fever it will be seen that much can be done to prevent this disease. Only such water as is perfectly pure should be used for potable purposes. If there be any doubt, the water should be boiled well and cooled by placing ice around the receptacle holding the water and not in the water. To prevent the spread of the disease everything which comes in contact with the patient should be thoroughly disinfected after its use. Windows, not only of the sickroom but of the house, should be thoroughly screened. The excretions of the

patient should be so covered that they are not accessible to flies.

The excretions from the bowels and the urine should be collected in vessels containing some disinfectant, as carbolic acid (1 to 20) or bichlorid of mercury (1 to 1000). Do not use the bichlorid of mercury in metallic dishes. Before throwing the excretions away they should be mixed well with chlorinated lime or a strong solution of copper sulphate, and allowed to stand for a short time.

Bedclothing should be soaked in bichlorid of mercury solution or carbolic acid solution before washing. Gauze or handkerchiefs used to collect the nasal and pharyngeal secretions should be burned. A separate set of dishes should be used for the patient.

Wash the perineum and surrounding skin with some antiseptic solution after each bowel movement.

Clinical Symptoms.—The disease is gradual in its onset. The prodromal symptoms are lassitude, malaise, loss of appetite, headache, especially of the frontal type, dizziness, insomnia, slight cough, pain in the nape of the neck, catarrhal conditions of the nose and throat, nose bleed, vague pains, and often slight diarrhea.

Temperature.—The fever rises gradually with a step-like curve with daily remissions of one-half to two degrees, and reaches its height usually in seven to fourteen days. After reaching the fastigium the temperature remains there with but slight diurnal remissions for a period of about one week when it begins to decline with marked daily remissions. The temperature generally reaches the normal at the end of the third week or the beginning of the fourth week.

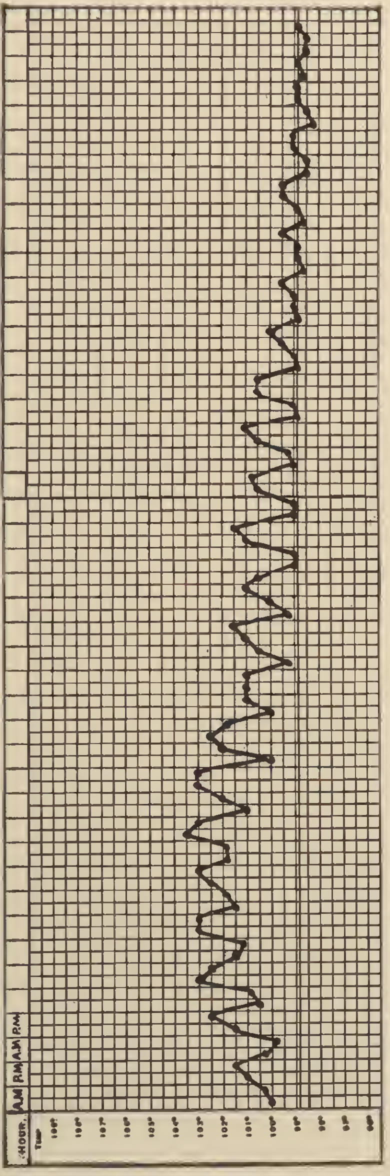


Fig. 11.—Temperature chart of typhoid fever.

A temperature of 103.5°–104.5°F. is the average in the second week of typhoid fever. If the fever persist at 105°F. for any length of time, it is serious. A continued high temperature may be due to some complication as otitis media, pneumonia, etc. A sudden fall in temperature may be due to intestinal hemorrhage or perforation of the bowels. In the decline of the fever a sudden rise may be due to the onset of some complication, to constipation, an error in diet, or mental emotion.

Spleen.—The spleen as a rule is enlarged. The enlargement is generally perceptible at the end of the first week and disappears in the second or third week. A persistently enlarged spleen is said to be indicative of a relapse.

Countenance.—The face is at first flushed and the eyes bright; later the patient becomes listless and the expression dull.

Eruption.—This occurs at the end of the first week. It appears in crops lasting from one to four days. Its presence is especially noticeable on the front of the abdomen and chest as a rose-red papular eruption, which disappears on pressure.

Tongue.—The tongue at first is only slightly coated and is moist. As the disease progresses there is a tendency for the tongue to become dry, and in severe cases a dry tongue with numerous deep cracks is not an uncommon occurrence. The tongue is protruded very slowly, due to the apathetic condition of the patient.

Stools.—The bowel movements in over fifty per cent. of cases are of a yellow ochre color and are called *pea soup* stools. The odor is very foul and more or less characteristic.

Tympanites or distention of the abdomen occurs to some extent in nearly all cases of this disease. It may reach an alarming degree and interfere with the action of the heart and lungs.

Respiratory Tract.—Bronchitis of varying degrees is a very frequent accompaniment of typhoid fever. Pneumonia may occur in the course of the disease or as a complication.

Circulatory System.—The pulse during the first week varies from 75 to 85 and is in proportion to the rise of temperature. Later in the disease the rise of temperature is greater than the advance in the pulse rate. A pulse rate of 120 in the second week of typhoid fever, if not due to a complication, is said to be a signal of danger. The pulse is often dicrotic after the first stage of the disease. Pericarditis and endocarditis are rare complications of typhoid fever.

Thrombosis of the vessels, especially those of the thigh, is not uncommon. Gangrene of the extremity may follow.

Digestive System.—Tongue (see above).

Diarrhea occurs in fifty per cent. of cases, and if a purge be given, excessive catharsis may follow.

Vomiting is not common, but does occur in the third week, due to an error in diet, perforation of the bowels, or local peritonitis.

Sordes of teeth and lips is an accumulation of food, micro-organisms and epithelia.

Hemorrhage or perforation of the bowels may occur. For a description of these see the section on Detection of Complications.

Musculature.—The muscles diminish in size and be-

come flabby. Emaciation is rapid in cases associated with diarrhea.

The *urine* is diminished in amount, is highly colored, specific gravity is raised, urea is diminished, and albumen may be present in small quantities. In some cases the urine is greatly increased in amount and of a light color. The Ehrlich diazo reaction may be present, a description of which may be found in more exhaustive works.

Nervous System.—Delirium occurs in a large percentage of cases, and may be of the active or noisy type, or the low-muttering form. The latter is more common. It occurs in the second or third week. The patient becomes stupid, mutters to himself, may pick at the bedclothes (carphologia). A twitching of the wrists, etc., is often present (subsultus tendinum). The patient may lie with the eyes widely open and stare in one direction for some time (coma vigil).

Convulsions may occur in the young.

Other symptoms which may occur are deafness, bed sores, sweats, boils, jaundice, laryngitis, hypostatic congestion of the lungs, neuritis, nephritis, bone lesions and arthritis.

Diagnosis.—This can usually be made from the several days of malaise, frontal headache, slight cough, loss of appetite, nose bleed, rose rash, and enlarged spleen, together with the temperature characteristics.

Typhoid fever may be confused with acute miliary tuberculosis, gastro-intestinal disorders, auto-intoxication, cerebrospinal meningitis, pneumonia, remittent fever, secondary syphilis, bronchitis in children, ulcerative endocarditis, influenza, trichinosis, appendicitis,

septic processes, typhus fever, articular rheumatism, and abscess of the liver.

For the Widal reaction see section on Bacteria in the Addenda.

Prognosis.—The prognosis depends greatly on the treatment. The institution of baths in the treatment of typhoid fever has greatly reduced the rate of mortality. A more or less persistent temperature of 105° in the first week is grave. A pulse of 120 or over is serious.

Diarrhea does not seem to have any effect on the prognosis unless it be exhausting.

Marked tympanites may cause pulmonary complications and may portend perforation of the bowels. Hemorrhage is weakening. Perforation is very serious. Severe nervous symptoms are serious.

Care and Management.—Prophylactic measures are of utmost importance in combating the spread of typhoid fever. The nurse being in constant attendance will play the chief rôle in preventing the propagation of the disease to other members of the patient's family or to the individuals of the community. No person caring for a typhoid fever patient should cook or handle food for other people.

The water supply, as has already been indicated, is the chief source of danger. All water used by the patient and the family should be of a known purity. If it be impossible to get an absolutely pure spring water, then the regular drinking water may be used, but it must first be made danger-free. This can be very easily accomplished by boiling. The water should be boiled vigorously for fifteen minutes and then allowed to cool.

Do not place ice in the water after it has been boiled, for in doing so the water is rendered liable to infection.

The proper way of cooling the water is to place the pitcher or receptacle filled with water into a larger dish or pan, and then surround the pitcher with cracked ice. In this way you prepare iced water and not ice-water.

Milk is another source of danger and unless known to be absolutely free from infection should be rendered so. Milk may be either sterilized or pasteurized.

To *sterilize milk* it must be kept at the boiling point (212°F. or 100°C.) for fifteen or twenty minutes. Sterilization of milk renders it less digestible, precipitates the albumen and partially destroys the fat emulsion.

Pasteurization is to be preferred if the milk is to be used within twenty-four hours. This is done by raising the milk to a temperature of 155°F. or 68°C. for thirty or thirty-five minutes and then rapidly reducing the temperature to 50°F. or 10°C. Place in the refrigerator, ready for use. Pasteurization destroys the germs but does not produce the changes in milk that sterilization at the boiling point does.

We have considered the methods of preventing the spread of typhoid fever from outside sources; now let us consider the dangers of infection from the patient himself.

All secretions and excretions of a typhoid patient may be a source of infection, some to a greater degree than others.

First, we have the *secretions from the nose and throat.* These are usually collected on handkerchiefs. It is better to use for this purpose pieces of old muslin or linen. The cloths after being used by the patient should be burned and not washed. Expectoration should be expelled into small pieces of tissue paper and immediately destroyed by fire.

Clothing.—The undershirt and gowns which are

contaminated by perspiration and possibly by urine, should be thoroughly soaked in ten per cent. solution of carbolic acid before they are washed and boiled.

The *urine and feces* are a most dangerous source of infection. The urinals and bedpans should contain some antiseptic, as ten per cent. carbolic acid solution, solution of copper sulphate, chlorinated lime; if the vessels are not metallic, a 1 to 500 solution of the bichlorid of mercury should be used. The antiseptic should be placed in the vessel *before* and not after using. Thoroughly mix the excretive matter with the antiseptic and allow it to stand for a while before emptying it out. In the country and in houses not connected with a sewer system, the excretion should not be thrown into the privy vault, but into deep trenches, dug some distance from wells and cisterns and where the natural grade of the ground is away from the water supply and creeks or ponds. The trenches should be three feet deep and provided with a cover. They should have a bottom of three inches of unslacked lime. The excreta should be disinfected before being emptied into the trench. Lime should be sprinkled in after each load of excreta. The trench should not be filled with excreta, but be covered in with lime and earth when half filled, and another trench dug.

Diet.—What should constitute the diet during the course of typhoid fever is a much debated question. Although many diverse statements have been made on this subject, nevertheless, according to the majority of physicians, milk forms the basis of diet.

At least four ounces of milk should be given every two hours. If whole milk does not agree with the patient, it should be diluted with plain sterile water,

limewater or Vichy. Water should be given freely, but it cannot take the place of milk.

The author has found a very valuable diet during the acute stage of typhoid fever to be one which is partially based on the caloric value of foodstuffs. The patient is to receive an eight-ounce feeding every two hours from 8 A. M. to 8 P. M., and then is placed on a four-hour schedule until 8 the next morning. The diet consists of two parts—*the milk mixture* and the *carbohydrate mixture*—which are to be given alternately. The milk mixture consists of six ounces of whole milk, into which is thoroughly beaten the white of one egg, and then one teaspoonful of milk sugar is to be added. The balance of the eight ounces is to consist of plain water, or equal parts of water and limewater. The *carbohydrate mixture* consists of eight ounces of farina gruel or cream-of-wheat gruel, made as directed in the recipes found in Chapter IV, using a teaspoonful of milk sugar to each feeding. As the disease progresses toward convalescence the whole egg, instead of the white only, may be employed in the milk mixture. If it be considered necessary, spiritus frumenti or spiritus vini Gallici may be added to each feeding of the milk mixture.

Other articles of diet which the author has found valuable, and which break the monotony, are clam milk, oyster milk, ice cream and junket.

Lemonade, weak tea and coffee are allowable. Beef tea, beef broth, some form of predigested beef, gelatin, egg-albumin water and barley water may be given, depending on the physician's orders. For the preparation of these articles of diet see Chapter IV.

No solid food is to be given until the temperature has been normal for at least ten days.

The *medicinal treatment* of uncomplicated cases of typhoid fever amounts to almost nothing. Recovery depends mainly on general measures and good nursing.

Fever.—The reduction of temperature by means of drugs in typhoid fever is almost obsolete. The physicians of today depend nearly entirely on hydropathic measures. A nurse to be thoroughly proficient must know not only how to apply the different means of reducing fever without the aid of drugs, but must also know their relative value and indications.

When the temperature is moderate (103°F.) cold baths need not be given. The regular daily cleansing bath together with proper ventilation, light bedclothing, and cooling drinks are all that are necessary.

When the fever rises above 103°F. more vigorous means are demanded. Cold sponges, alcohol rubs, cold packs, and cold tub baths are the more common methods. For details of these see Chapter V.

The systematic use of baths has greatly reduced the mortality in typhoid fever. Applications of cold not only reduce the fever but accomplish equally if not more important other results, as quieting delirium, overcoming insomnia, steadying the pulse and heart, and improving respiration.

It was said at one time that baths were contraindicated in hemorrhage and perforation of the bowels. It has been established that hemorrhages do not contraindicate the giving of cold baths.

Plenty of water given internally also tends to lower the temperature by inducing sweating, thus losing heat by evaporation and through abundant hot urine.

There is one important condition which necessitates abstention from giving baths, and that is a weak heart.

When cold is first applied to the body the surface capillaries are generally contracted, the arterial tone is raised, and the blood accumulates in the deep organs. This places a sudden and extra labor on the heart and may cause dilatation and sudden collapse.

The use of external cold in the form of sponges, packs, etc., as an antipyretic measure is usually instituted when the temperature reaches 103°F. It is important that the temperature be not reduced lower than 100.5°F., because after the completion of the bath the temperature usually falls a degree or more. If the temperature be kept above the normal there is no danger, but great care must be taken because when the temperature is reduced below 100°F. it at times falls very rapidly and collapse may follow.

In applying cold by any method surface reaction is of prime importance. In order to obtain this, constant and somewhat vigorous friction and rubbing are necessary. During the procedure the patient is not to be allowed, under any circumstances, to exert himself. He is to be absolutely passive, as conservation of heart energy is a most important object. It is very seldom necessary to give more than six baths in a day. The patient is exhausted when the baths are too frequently given and they become a source of harm rather than of benefit. The writer left word with the nurse on one of his typhoid cases that she should give the baths at such times as she thought necessary. The next morning the patient was in a more or less exhausted condition. The nurse on being asked how many baths were given since the last visit, which was the day before, replied eighteen. This accounted for the great weakness of the patient.

Bed Sores.—These common occurrences are first to

be prevented from forming; if this be impossible, then measures must be adopted to induce rapid healing.

To prevent them two objects are to be accomplished —removal of pressure against the parts, and hardening of the skin. The first is brought about by frequent changes in the position of the patient or by interposing some cushion between the parts pressed upon and the bed. For this purpose the rubber pneumatic ring or large pads of cotton may be used.

To harden the skin, bathe the parts with alcohol or paint them with a mixture of aloes and glycerine. (Take one ounce of the tincture of aloes and heat it until it is evaporated to one-half ounce. While it is evaporating add gradually six ounces of glycerine.) A most efficient means is to rub the parts with a fresh slice of lemon. Applications of salt and whiskey are good (salt, one dram; whiskey, eight ounces).

When the sore is formed the above measures are useless. The sore must be kept very clean, preferably by syringing with peroxid of hydrogen and then rinsing with sterile water. Some ointment, as twenty-five per cent. ichthyol ointment, should then be applied.

The *mouth should* be kept scrupulously clean. A very good mouth wash is prepared as follows: Boric acid, one dram; juice of one lemon; glycerine, one ounce; and water to make four ounces. A 1 to 1000 solution of potassium permanganate makes an excellent wash.

Nausea and vomiting, although rare in typhoid fever, may occur. A mustard plaster placed over the pit of the stomach or an ice-bag on the epigastrium are very useful. Limewater added to the milk will be successful in many cases. A measure which is easily applied and often works well is the inhalation of vinegar fumes.

Diarrhea is very common. When the bowel move-

ments number more than six in twenty-four hours, active measures must be taken to stop the diarrhea. Enemata of starch paste and laudanum, together with a mustard paste applied to the abdomen, are very useful. Meat juices and broths should be discontinued if they are being given, as they often cause the diarrhea. The diet should be reconsidered; probably the patient is receiving too much milk or milk not sufficiently diluted.

Tympanites is a common and at times a very troublesome symptom. It is due to fermentation in the bowels, to paresis of the muscular coat of the intestines, or to a combination of both. If due to fermentation, intestinal antiseptics, such as salol, thymol, sulphocarbolates, etc., and evacuation of the fermented material by means of laxatives or enemata are indicated. If due to sluggishness or paresis of the bowels, an intestinal tonic or stimulant, as turpentine, is indicated. Turpentine is the best drug we have for relieving the tympanites. It may be used in three ways: internally, about which the attending physician will give instructions; by rectum; locally to the abdomen as stupes.

Asafetida as an enema is also very useful in expelling gas. (See Chapter XXIX for instruction in preparing enemata and stupes.)

Constipation.—The bowels should move at least once a day. After the first week it is advisable not to use cathartics but to resort to enemata. Enemata of soap suds, glycerine and water, cotton-seed oil, or the purgative enema may be used. (See Chapter on Enemata.)

Epistaxis, if it persist or be profuse, should be treated. Douching the nose with plain hot water, or hot water and vinegar, is useful. Spraying the nose with a 1 to 1008 solution of adrenalin chlorid is useful.

Delirium is best combated by cool sponges and baths. Opium in the form of Dover's powder is beneficial if a sedative be necessary.

Hemorrhage and Perforation.—See Chapters VI and VII, Part I.

Care in Convalescence.—During this period care as great as, if not greater than, that during the general course of the disease is necessary. As convalescence advances the visits of the physician become less and less, the responsibilities of the nurse become greater and greater. It is at this time that the patient regains that which he had lost during the run of the disease, as blood, fat, muscular tissue, nervous and mental energy.

The dangers of convalescence are many. The patient acquires a ravenous appetite and demands a greater amount of food and even makes threats as to what he will do if an increased amount of diet be not oncoming. Great vigilance on the part of the nurse is necessary.

Solid food should not be given until the temperature has been normal for ten days; in the meantime the diet can be varied with eggs in different forms, cereals, jellies, gruels, toasts, etc. Perforation of the bowels has occurred late in convalescence due to the eating of a meat chop.

A rise of temperature during convalescence may be due to a true relapse, which as a rule pursues a shorter and milder course than the general attack; or it may simply be a recrudescence due to constipation, an error in diet, or to mental excitement. A visit from an unwelcome person may send the fever very high.

The patient should at first sit up in bed for a short time daily, then should sit up in bed to eat his meals and later to read or to receive visitors. As he gains strength he may sit in a chair for a short time, but

should not receive visitors during the first few *séances*. Walking about the room, first aided and later unaided, should be gradually undertaken.

Typhoid Prophylaxis or Prevention.—When typhoid fever is prevalent in a community it is a duty of the nurse to use her greatest influence to encourage the people to protect themselves against the disease not only by sanitary and hygienic measures already reviewed, but by means of typhoid vaccination. This means of prevention is well established and has been repeatedly proved to be most valuable.

Typhoid vaccine is best given in three inoculations repeated at weekly intervals. As paratyphoid fever is becoming more prevalent it is well to use a mixed vaccine, that is, a vaccine which protects against both typhoid and paratyphoid fevers. The inoculations must be given under most aseptic conditions. The apparatus must be sterile, the vaccine must be carefully handled to prevent contamination, and the site of injection should be thoroughly cleansed. The writer has found the application of tincture of iodin to the site before inoculation is helpful. The injection may be made in the deltoid area of the arm, between the scapulæ, or in the side of the abdomen. The inoculation must be under the skin and not into the muscles. Care should be taken to avoid veins.

Reactions of a local or general nature sometimes follow the inoculations. These are said to be favored by tiredness on the part of the individual, by excessive eating, by the use of alcoholic beverages, and by the presence of any slight illness. The injection should be given in the latter part of the day so that the person will have retired before the appearance of the reaction. Care as to diet and exertion should be exercised on the day of inoculation.

Paratyphoid Fever

From the experience of the author, it seems proper that this disease be considered under a separate description. Owing to its similarity and confusion with typhoid fever, it is best described here. The author's recent writing* is freely employed.

Historical.—Over 300 cases of this affection have been reported in literature, which have followed a course resembling that of typhoid fever, but in which the causal element was found not to be the *bacillus typhosus*. Archard, in 1896, described the first two cases of paratyphoid fever, and isolated a bacterium differing in many ways from the typhoid bacillus. In rapid succession, cases were reported and the bacillus studied by Widal, Cushing, Jurgens and others.

Etiology.—The *bacillus paratyphosus* belongs to the genus Typhocolon. It stands between the colon bacillus and the typhoid bacillus, probably in closer relationship to the latter. Of the members of this family, the *bacillus coli communis* and the *bacillus typhosus* are diametrically placed, with the members forming mid-groups, the paratyphoid bacillus closely approximating the *bacillus typhosus*, whereas the bacillus of Gaertner, or the bacillus of meat poisoning, which also is closely related, is placed nearer the *bacillus coli*. The *bacillus paratyphosus* differs from the bacillus of typhoid fever in that the former is shorter, more slender, less flagellated and more motile. It also is unlike in certain cultural properties. From the *bacillus coli* it is distinguished by its failure to produce indol.

Prodromes.—The onset of this disease is generally

* N. Y. Med. Journ., xcii, p. 809.

of brief duration and somewhat abrupt. The patient who was in former good health is soon complaining of various muscular and so-called bone pains. Stiffness of the neck has been a very prominent symptom in this series of cases. Chills are not common, but the occurrence of chilly sensations and more or less profuse sweating are not infrequent. Sore throat, severe headache, pain in the "pit of the stomach" are ofttimes present. This short prodromal period of from three to five days' duration contrasts markedly with the long-drawn, insidious onset of typhoid fever with its malaise, anorexia and insomnia.

Symptoms.—The general symptoms of the disease are of early advent. The patient may present an anxious and flushed appearance for the first few days and stupidity may exist in a mild form, but in the writer's cases these signs soon disappeared and the patients became extremely bright and placid, troubled not in the least with insomnia. In severe cases, great dulness of intellect and delirium may occur. The headache of the prodromal period, which is rather a pain (cephalalgia) than an ache, soon lessens and disappears. The *alimentary symptoms* are to a certain extent characteristic. The tongue, which in typhoid fever is early swollen, thickly coated and tremulous, and later dry and fissured, in this disease remains moist throughout, is of normal size and only lightly coated. Sordes do not tend to collect. The appetite is usually blunted in the early stage, but rapidly returns, even before the fever has desisted. Redness of the pharynx and painful swallowing, which may have been pronounced in the prodromal state, become less and pass away. Nausea and vomiting are of frequent

occurrence in the early days of the disease. The intestinal condition is quite typical. Although diarrhea does occur, it is not the rule, and constipation is much more frequent. In the writer's cases the evacuation of formed feces throughout the cou se of the disease was characteristic. Tympanites of great degree is not common, although slight abdominal distention does

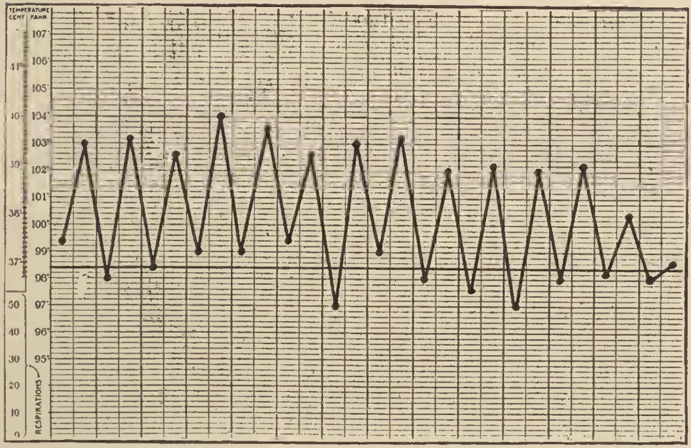


FIG. 12.— Temperature chart of a case of paratyphoid fever, showing the oscillations of fever.

occur but, as a rule, is not troublesome. The spleen is usually enlarged; even if not palpable, it may be revealed by percussion. The liver is found enlarged in a great percentage of cases. Intestinal hemorrhage is not frequently met with. It occurred in only one of the author's cases.

The febrile manifestation is extremely characteristic. High fever may occur in the early stage, and the fas-

tigium is rapidly reached. The diurnal remission of temperature is a very pronounced and indicative sign. From the beginning of the disease the fever may remit daily, very often to normal. The fall of temperature is frequently as much as 4° or 5°F. The accompanying chart, which is quite typical of all the cases of this series, distinctly shows this oscillation of temperature. The fever, which in many instances is of shorter duration than in typhoid fever, may continue for an extended period. In one of the writer's patients the febrile period lasted thirty-nine days. The decline may take place by crisis or lysis.

The skin may present a roseolar eruption which occasionally is typhoid-like, or more often as dark, blotchy lesion with tendency toward confluence. Sweating may be marked in the early stage. The pulse rate is slow, compared to the degree of fever present, and may take on a dicrotic quality.

Complications of a purulent nature seem to be not at all uncommon, arthritis, otitis, osteomyelitis and parotiditis being the most frequent. Intestinal hemorrhage, if it occurs, is not alarming. Perforations of the bowels I have not seen reported in literature.

But little can be said of the *prognosis* in paratyphoid fever, for reason of the limited number of cases reported in literature. As a rule, the course of the disease is shorter and milder than that of typhoid fever. In some instances the duration of the affection has been twelve weeks or longer. Convalescence may be very tardy and relapses are not uncommon. Complications are frequent. The mortality in reported cases has been about three per cent.

Diagnosis.—The diagnosis of paratyphoid fever is

of most import to us. The clinical course of the disease bears a close resemblance to that of typhoid fever, and it may be absolutely impossible to distinguish the two diseases clinically. There are, however, certain points of dissimilarity. The abrupt onset, the short prodromal period, the marked diurnal remission of temperature, the blotchy eruption, the moist tongue and the bowel condition of paratyphoid fever will greatly aid diagnosis. The surety of diagnosis must, notwithstanding, rest on bacteriological methods. The repeated absence of the Grueber-Widal reaction is of utmost importance. Gwyn has said that this reaction is found in 99.6 per cent. of all patients suffering from typhoid fever; hence its constant non-appearance, or its occurrence only in low dilution (1 to 10 or 1 to 5), in a typhoid-like disease is very suggestive of paratyphoid fever. The finding of a paratyphoid agglutination is typical and may occur in dilution as high as 1 to 6000. The most conclusive evidence, however, is the isolation of the bacillus from the patient's blood.

Very few instances of necropsic examinations are recorded; therefore, our knowledge of the morbid anatomy of this affection is limited and very incomplete. Intestinal lesions have been described in the form of slight ulceration, but the Peyer's patch and lymphatic changes are wanting. Splenic enlargement was the rule.

Regarding treatment, there is little to be said, excepting that it should be rational and conducted on the same lines as in typhoid fever, as rest in bed, liquid diet, antipyretic measures and the endeavor to prevent the occurrence of complications, the thorough disinfection of all excreta.

CHAPTER X

SMALLPOX

Definition.—An acute infectious fever characterized by an eruption, successively, of papules, vesicles, pustules, and crusts.

Etiology.—The exciting cause of variola is unknown, but it is probably a micro-organism of some type. All ages are liable to the disease. Negroes and dark-skinned people are especially susceptible.

Smallpox is the most communicable of all diseases. It spreads widely, and, as a rule, attacks all exposed persons unless protected by vaccination, previous attack, or by natural immunity.

The contagion often exists in the breath, secretions, and in the dry scales. The disease may be transmitted from dead bodies.

Symptoms.—Prodromal symptoms are not common. The disease usually begins suddenly and with severe symptoms. Three or four days of general malaise may precede the invasion.

The symptoms are severe chill, intense headache, excruciating pains in the back and limbs, vomiting, fever, loss of appetite, and at times convulsions.

In many cases there is an *initial rash* which may resemble the rash of measles or scarlet fever.

The *fever* begins abruptly high and gradually lowers until the fourth day or such time as the eruption makes

its appearance, when the temperature is normal or nearly so. This is a period of great importance as the patient who formerly had severe pains, high fever, and was generally ill is now free from fever and pain, and may consider himself well and thus expose others to the disease. This period lasts for only a few days, until the eruption assumes the pustular type when the temperature goes up to 104° to 105°F. and the patient becomes desperately ill.

The *eruption* begins from three to five days after the invasion. The first manifestation consists of *papules* especially on the forehead, neck, and wrists. The papules will roll under the finger as though they were small shot in the skin. This is very characteristic. In two or three days the papules are transformed into *vesicles*. These contain clear serum and are multilocular; that is, they are composed of several pockets and if pressed with the finger the serum will only partially escape as some of the pockets are still intact. These vesicles become *umbilicated*, as though the top were being drawn in by a string, a small depression being formed on the summit of the vesicle. In two more days, or on about the eighth day, the vesicles become filled with cloudy material of a purulent character. The eruption has then reached the *pustule* stage. With the formation of the pustules the temperature becomes high, 105°F. The pustules begin to dry in a few days and the *crusts* are formed.

During the course of the disease the pulse becomes rapid and feeble and delirium of a severe type may develop; prostration is pronounced.

Varieties.—*Confluent* smallpox is very severe. This type is characterized by very grave symptoms and

an eruption similar to that described above, but the papules, etc., are very close and thickly set, and accompanied by great swelling of the parts. Superficial abscesses are common. The prognosis is grave.

The *hemorrhagic* type is the most severe form. Hemorrhages occur in the skin around the vesicles and into the pustules. Death, as a rule, follows speedily.

Varioloid is a form of variola modified by vaccination. The symptoms are mild. The eruption passes rapidly through the different stages. There is no secondary fever.

Complications are laryngitis, edema of the glottis, bronchopneumonia, gangrene of the skin, abscesses, and pock marks.

Prognosis.—In the unvaccinated the mortality varies from twenty-five to fifty-five per cent., and in the vaccinated from five-tenths to two per cent.

Diagnosis from Chicken-pox.—The invasion is not as severe in chicken-pox. The eruption of smallpox passes through successive stages, but is, during the vesicular stage, entirely composed of vesicles and there are no papules nor pustules. The papules in chicken-pox do not have the *shotty* feel. The vesicles are not umbilicated or multilocular. In chicken-pox the eruption comes in crops, and at the same time papules, vesicles, and crusts may be discovered. The formation of pustules is not common in chicken-pox.

Care and Management.—The care and management of a case of smallpox does not differ much from that of any other contagious disease. A most important part of the care is the prophylaxis, which consists chiefly in vaccination.

Before the discovery of vaccination by Jenner, small-

pox was a most horrible destructive agent to human life. It is estimated that in Great Britain alone over 30,000 deaths were due to this disease every year.

Vaccination produces in human beings an immunity toward smallpox which, though it is not always absolute, is very highly protective. The disease itself does not entirely protect the patient from future attacks. There are many cases on record of a second attack of the disease, and even a seventh recurrence is reported.

There has been much discussion over the protective power of vaccination. Some members of the medical profession have gone so far as to state that vaccination is not only not beneficial, but is harmful. If we could protect persons from attacks of other diseases as absolutely as we protect them from smallpox by means of vaccination there would be but little need of physicians and nurses. According to Dr. Stark, of England, of 6000 persons inoculated with smallpox virus after a previous vaccination not a single one contracted the disease.

It has been said that vaccination may introduce into the patient various diseases as syphilis, tuberculosis, erysipelas, etc. It is true that in past years, when humanized vaccines and impure bovine vaccines were used, these diseases may have been some few times transmitted, but today with improved and pure vaccines this is practically impossible. The only source of danger is the introduction of pathogenic micro-organisms by means of the instruments, dressings, or hands of the attendants; but this is a possibility in the case of any wound and can be entirely eliminated by heeding the principles of asepsis and antisepsis.

All children should be vaccinated during the first

year of life. Revaccination should be performed at the fourteenth year. Physicians and nurses should be vaccinated whenever an epidemic of smallpox is impending, regardless of the length of the interval since the previous vaccination.

Method of Vaccination.—The cuticle is removed by means of a few scratches of a sharp, sterile sewing needle. The object is not to draw blood, but simply to produce an oozing of serum. The vaccine is placed on this excoriated area and is slightly "worked in" with the needle.

The most common place for vaccination is at the site of insertion of the deltoid muscle in the upper and anterior part of the arm. In right-handed persons use the left arm. The female sex, especially those of the upper class, prefer to have it on the thigh for obvious reasons.

Much opposition has been aroused toward vaccination because occasional bad after-effects occur. Most of these ill results are due to neglect or faulty technic. Many physicians and nurses look upon vaccination as just a scratch instead of a surgical procedure as it really is.

First the field of operation should be made aseptic. The author has the site and much surrounding skin thoroughly cleansed with hot soapsuds and then rinsed with sterile water, and wiped dry with gauze or cotton. He does not use an antiseptic for he has found that it interferes with or prevents the action of the vaccine.

After vaccination has been completed the surrounding skin, except that within a radius of three-fourths of an inch of the site of inoculation, is painted with the tincture of iodine and a plain sterile gauze dressing applied. No shield is employed. By following this method he has never had an ill result.

Signs of Vaccination.—For the first three days nothing is noticed as a rule. On the fourth day there may be slight redness around the site of vaccination and also some itching. A small papule may now be seen. By the seventh day this papule or pimple has become a vesicle or small blister filled with a clear liquid. A red zone forms around this vesicle and may be very extensive. Usually about the tenth or twelfth day the liquid oozes out of the vesicles and a scab is formed which may adhere to the skin for several weeks. After the scab or crust falls off a reddened depression or pit remains which becomes white in time.

In some individuals there is no discomfort of any kind and they would entirely forget they were vaccinated except for the occasional brushing of the affected arm against some resisting surface. On the other hand, some persons become profoundly ill for a short time, due to the constitutional effects of the vaccine. On the third or fourth day fever may begin and persist for four or five days. The appetite is lost, headache and malaise are common, and children may become restless at night. Often the axillary or inguinal glands enlarge, depending on the site of the vaccination. Suppuration, if it occurs, is due to some fault in technic. The arm or thigh where vaccination is to take place should be thoroughly cleansed with soap and water and some antiseptic solution, and finally rinsed with sterile water. The needle and dressing should be perfectly sterile.

Sufficient has been said on the subject of vaccination. We will now consider the general management of a case of smallpox.

Isolation is of utmost importance and will probably be secured by the Health Board of the community.

The patient should be placed in bed in a well-ventilated room. Light is to be restricted as much as possible. The bedclothing should be light.

Fever should be combated as in other febrile disorders (see Chapter V).

The *diet* should be liquid and nutritious, consisting principally of milk, broths, gruels, etc. Water should be freely given.

For the intense *pain* in the back and limbs, which is so common in the beginning of the disease, nothing can be done except giving anodynes, or the application of ice or hot water bags. Plasters and poultices should not be used as they increase the irritation of the skin.

The *pulse* should be carefully watched so that stimulation can be instituted as soon as it may be necessary.

General indications should be met as they arise.

Pitting.—There is one sign which demands special consideration, and that is how to treat the eruption so as to leave the least amount of pitting. A great many methods have been described to prevent the pitting in smallpox. In some instances they do good, whereas in other cases pitting results regardless of the greatest care taken to prevent it.

The room should be darkened. It is advised to permit only red light to strike the patient. This can be accomplished by having red curtains on the windows, red lamp shades and even red wall paper and hangings.

Probably the best method to prevent pitting is to keep the parts constantly moist by covering them with cloths moistened with a dilute solution of carbolic acid or bichlorid of mercury. A very satisfactory way is to anoint the parts with a 1 to 100 oily solution of carbolic acid, or carbolated vaseline of the same strength.

Touching the base of each ruptured vesicle with a stick of nitrate of silver has been advocated.

Keeping the crusts well soaked with vaseline is of prime importance. Whenever carbolic acid is used as a local application, careful watch of the urine should be kept, in order to detect the signs of poisoning from absorption (see Chapter XXVII).

Warm baths should be given to facilitate the separation of the scabs.

CHAPTER XI

CHICKEN-POX

Before beginning the description of chicken-pox let it be distinctly understood that excepting for part of its name it bears absolutely no relation to smallpox, and that neither disease protects the individual against the other. Vaccination has no influence on chicken-pox. Varicella is a name often applied to chicken-pox.

Chicken-pox may be taken directly from the infected person or may be carried by a third person or on infected articles. Children are mostly affected, but adults may contract the disease. One attack usually protects for life and second attacks are very uncommon. The incubation period is usually from nine to fifteen days.

Chicken-pox usually begins quite suddenly with the eruption, but at times this may be preceded a few hours by some ill feeling. The eruption comes out in "crops," which is very characteristic. The appearance of the successive "crops" may be separated by a period of a day or two. The first "crop" usually comes on the back or abdomen, to be followed later by those on the face, scalp and limbs. The eruption has three distinct stages: first the appearance of small red spots or papules resembling flea or mosquito bites, soon there appears on this red spot a small glistening vesicle or water blister which in time is followed by the drying process with the formation of the crust or scab. As the eruption comes in successive crops we thus have at one time all forms of

eruption—red spots, blisters and scabs. The rash is thickest on the back, chest and head. In rare instances the spots may ulcerate and even gangrenous areas may occur.

Other symptoms are slight fever, coated tongue, restlessness, disturbed sleep and often extreme itching.

The scabs in the course of a few days begin to fall off and leave behind a slightly reddened area which soon becomes natural color. Pitting after chicken-pox is uncommon. As a rule convalescence is rapid and complications unusual, although ulcerated and gangrenous areas may form, and boils, hoarseness, kidney disease and ear trouble have occurred.

The disease is infectious as long as the scabs or ulcerations persist and usually endures three to four weeks, during which time isolation of the patient and quarantine should be enforced.

Care and Management.—Mild cases require but little care, excepting rest in bed while the disease is at its height and regular feedings of light nutritious food. Itching is often very troublesome and requires attention. A sponge bath with saleratus water often helps. General care as discussed with other diseases will apply here.

CHAPTER XII

SCARLET FEVER

This disease is also known as scarlatina, red fever, Scharlach (German), Fievre rouge (French). It is often falsely believed that the term "scarlatina" is applied to a light form of scarlet fever, but this is not the case.

Scarlet fever is not as freely communicable as measles, but is more serious both in course and results. Most people sooner or later become afflicted with measles, but this is not the case with scarlet fever, for even many of those exposed to the disease do not contract it. After the age of fifteen years one is not so liable to take scarlatina. One attack protects more securely than does measles. The contagion is given off in the breath through the mouth and nose, and not so much by the scales of skin as formerly supposed. Scarlet fever is not communicable as early in the disease as is measles. The urine, discharges from nose, mouth, ears, and any sore or abscesses are highly infectious. Toys with which children play while ill with scarlet fever, unless very carefully and thoroughly disinfected, may be the means of spreading the disease months later.

Symptoms.—After a person has been exposed and infected it is usually two to six days, generally four days, before the first symptoms appear. Unlike the onset of measles the beginning of this disease is sudden. The three main symptoms of the *first day* are *vomiting*, *headache*, and *sore throat*. Other signs are also present, as

tiredness, loss of appetite, coated tongue, restless sleep and muscular pains. In very young or weakly children convulsions may occur. Usually the first symptom is vomiting. The child who has been previously well will, without cause, suddenly vomit. This is soon followed by more or less severe headache and soreness of the throat, especially when swallowing. The fever soon begins and may be very high the first day. On the *second day*, the characteristic *skin rash* may appear.

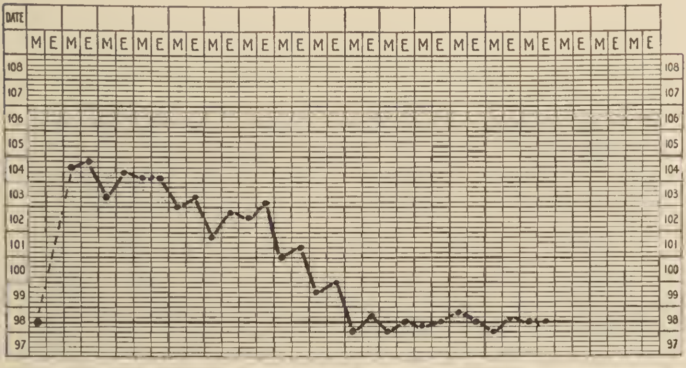


FIG. 13.—Temperature chart of scarlet fever.

This generally begins, contrary to measles, on the chest or body and later appears on the face. The rash varies from a pink to bright scarlet. It is not blotchy but diffuse and even. It takes on a so-called stippled appearance, a multitude of small points located on the general bright flush. There may be swelling of the skin. When the rash is fully out, if the open hand of the attendant be pressed firmly on the patient's back and then removed, there remains for some time a white

imprint of the hand on the patient's skin. Although the face may glow there is usually a characteristic pale spot on each side of the nose and around the lips. In six or seven days the rash has usually disappeared, fading away in the order of its invasion. On the second day the *tongue* may take on its peculiar appearance known as the strawberry or better the red raspberry tongue. This is due to the extreme redness of the tongue together with enlargement of the papillæ. The *throat* condition advances to great redness and even the formation of a membrane on the tonsil. The *glands* under the lower jaw enlarge and become tender. The fever continues high for two or three days and then gradually becomes lower, usually disappearing about the seventh day. The *pulse* in scarlet fever is usually quite rapid. The urine is decreased in amount and may be very dark. Nervous symptoms as flightiness, delirium, tremor and sleeplessness may occur. *Desquamation* or scaling of the skin is very prominent in scarlet fever. The more intense the rash the greater the scaling. The process may begin on the face as early as the third day and then progress over the body. The scales from the face are powder-like, whereas those from the back may be in great sheets. Almost perfect gloves of cuticle may be cast from the hands. Desquamation usually takes four weeks.

Complications and Sequelæ.—The complications of scarlet fever may be numerous and severe.

Pseudomembranous pharyngitis is not uncommon. There forms on the mucous membrane of the pharynx a false membrane, resembling to a degree that found in diphtheria. It is due to the streptococcus and is differentiated only by a bacteriologic examination. The fauces and tonsils are greatly swollen, as are also the

glands of the neck. It is in these cases that middle-ear disease is very liable, being due to infection through the Eustachian tubes.

Malignant, bloody, or black scarlet fever is a most grave condition. In this form there are hemorrhages into the skin. The exuded blood becomes dark, and from this it derives its popular name.

Otitis media is common and serious. It is due, as said above, to infection through the Eustachian tubes. It is a most common cause of deafness in children. The mastoid cells may become involved, and later meningitis and brain abscesses develop.

Cervical Adenitis.—The cervical glands enlarge to a minor degree in a large percentage of cases. In severe cases they may break down and slough, leaving large and indolent ulcers. At times an artery may be eroded when the slough is cast off, which may result in fatal hemorrhage.

Endocarditis is a not uncommon complication of scarlet fever. A patient who has struggled with difficulty to overcome the ravishes of a prolonged and severe attack of the disease may live only to be troubled through the remainder of life with a much weakened heart.

Nephritis, although a complication, is really a sequel and comes on after the general course of the disease. A child who is well advanced in convalescence may be exposed to drafts of cold air and develop nephritis.

It is an old and very proper saying: "In scarlet fever look out for the kidneys around the twenty-first day." Nephritis of a very severe type may follow a very mild attack of scarlet fever.

The urine, which hitherto has been of a fair amount

and contained only traces of albumen, now becomes very scanty, of a very dark color, and is loaded with albumen. It may be *smoky* or like *beef brine*, due to the presence of blood. The face and lower eyelids may become puffy and later a general edema may follow. There are gastric disturbances, and vomiting is common. Headache and pains in the back may be present. The disease may only be mild or may progress and signs of uremia develop.

The number of cases of nephritis following scarlet fever may be greatly lessened by careful nursing. Do not allow the child to leave its bed until directed by the attending physician. The child may have had a most mild attack and the parents may think it unnecessary to keep the child in bed, or the child may be restless and desirous of getting up in a chair, but *be careful*, for it is in these cases that the most malignant form of kidney disease may occur. Be careful about exposing the child to drafts.

Other important complications which may occur are pleurisy, pneumonia, chorea, rheumatism, and pericarditis.

Before discussing the treatment and care of the patient I wish to call attention again to the seven cardinal signs. During the first day we have: sudden causeless vomiting, severe headache, sore throat, high fever, convulsions in the very young.

Second day: diffuse scarlet punctate rash, strawberry tongue.

Care and Management.—How often do we hear the expression, "I have had a discharge from the ear ever since my illness with scarlet fever;" or "my kidneys have been weak," or "I am unable to work or exert myself as

other people do because my heart was affected by scarlatina years ago." These are very common experiences, and are very sad ones, because they could have been avoided in many cases if proper care and nursing were instituted during the attack of scarlet fever.

As in all highly communicable diseases *isolation* is absolutely necessary. The patient and her immediate attendants should be placed in a suite of rooms farthermost from the general rooms of the rest of the household. Nobody except the medical attendants should be allowed admission to the sickrooms. All the unnecessary furniture, hangings, and picture frames should be removed from the room. A separate set of eating utensils should be used. If there are any public library or school books in the house, they should not be returned until after disinfection.

The patient should be placed in bed and covered with light bedclothing. Ventilate the rooms well. Do not be afraid of air. Other children of the family should not be allowed to go to school or mingle with outside children. It is better not to remove them to another house as it is probably too late to be of good. They should not come in contact with attendants of the patient or any clothing from the sickroom. A daily walk in the open air is a necessity. Keep careful watch of them so in case they have become infected treatment may at once be instituted. Arrangements must be made to keep the patient in bed at least three weeks.

Diet.—As in all febrile disturbances the appetite is impaired and the digestive functions are below par; therefore, it is necessary to provide food which is easily digested and does not require much work on the part of the digestive organs. The kidneys are very easily dis-

turbed in this disease, so that food which is irritating to the kidneys, or throws extra labor upon them, should be eliminated from the diet. We know that meats, especially the red meats, do cause increased renal effort.

The requirements are that the food should be bland, liquid, or at least very soft, and highly nutritious. Milk will meet all these requirements and should form the basis of the diet. It may be diluted with water, lime-water, barley water, or a carbonated water.

Water should be freely given. Lemonade is allowable. A very pleasant beverage is prepared by adding a teaspoonful of cream of tartar to a quart of boiling water, the juice of a lemon, and sugar to taste. Serve cool.

A daily tepid or cool bath is of service and is refreshing. Should the temperature range high the bath may be made cooler and repeated several times during the day.

The mouth, nose, and throat should receive daily attention. They may be sprayed, swabbed, or douched with some mild antiseptic as a two per cent. solution of boric acid, a 1 to 16 solution of hydrogen peroxid, a 1 to 2000 solution of potassium permanganate, or one of the many alkaline antiseptics prepared by the reputable drug houses of this country.

For *pain* in the throat nothing is more serviceable than the external application to the neck of an ice-bag. If objections are made to cold, then hot water may be applied. In older children the sucking of small pieces of ice is very agreeable and beneficial.

Headache is best relieved by the application of an ice-bag, or rubbing the head with some evaporating solution, as alcohol or a two per cent. solution of menthol in alcohol.

Sleeplessness and delirium are best combated by cool baths and an ice-bag to the head.

Ear complications are not infrequent and are very serious. If the patient complain of earache, or a slight discharge is seen coming from the external auditory meatus, call the physician's attention to it at once.

For earache nothing is better than the application of heat. This is best accomplished by filling a common rubber fountain bag with water at a temperature of 105° F. Raising the bag just above the level of the ear, allow the warm water very gently to enter the external auditory canal.

When a discharge is present the ear may require douching. This is done in the same way, except with some antiseptic solution instead of water. A one per cent. solution of boric acid or a two per cent. solution of carbolic acid may be used.

Kidney Complications.—The main question is how to prevent the renal complications. In some instances they cannot be prevented, no matter what is done. If the following suggestions are heeded the danger will be reduced to a minimum:

Keep the patient in bed for a sufficient length of time, at least three weeks.

Prevent the patient from exposure to cold.

Give water freely.

Be careful in regard to diet. Permit no meat, broths or gruels.

When nephritis makes its appearance, the bowels must be kept freely open with saline laxatives. The diet must be entirely milk. Water should be given in abundance. The object is to relieve the kidneys of part of their work. Sweating is to be encouraged by hot

packs and baths. Hot normal saline enemata are very useful. Hypodermoclysis of normal saline solution may be given in the more severe cases.

Heart Weakness.—The toxines of scarlet fever seem to have a peculiar affinity for the heart structures, and may result seriously. If the pulse become rapid, irregular, or altered in rhythm, the medical attendant's notice should be called to it. Prevent as much physical exertion on the part of the patient as possible.

When *desquamation* begins the body should be anointed with some oily preparation, as olive oil, lard oil, vaseline, lanolin, or glycerite of starch. This will render desquamation more rapid and will prevent the diffusion of the scales. Before anointing the skin with oil or vaseline, it should be washed with warm soapsuds. All pieces of scaly skin should be immediately burned when removed.

Quarantine.—This is a much debated subject. No length of time can be given, but it can generally be said that quarantine must be enforced until desquamation or scaling has completely ceased. If scaling has ended and there is still a discharge from the nose, throat, or ear, danger is still present.

After the patient has recovered it is necessary to prepare the room for occupancy by the household. This is best accomplished by fumigation or disinfection. Foremost of all disinfectants at the present time is formaldehyd gas. Leave all the patient's and nurse's clothing in the room. Loosen the bedclothing and hang it about the room on chairs. Close all the windows and calk their loose joints and also the crevices about all doors. Open the drawers of all furniture in the room. Stand books on their ends and separate the pages. With a whisk

broom immersed in water, or a small sprinkler, dampen slightly the carpets and clothing in the room. Everything is now ready for the disinfection.

Formaldehyd gas is set free in three different ways: By heating wood alcohol; by heating the solid formaldehyd; and by heating formalin, which is a forty per cent. solution of formaldehyd. Apparatus for generating the gas may be purchased for a moderate sum, or an ordinary alcohol lamp placed under a tin vessel containing formaldehyd or formalin may be used. Henry V. Walker, of Brooklyn, has devised a very simple and effective method of generating the gas, devoid of all danger.

To six ounces of formalin add two ounces of commercial sulphuric acid, and mix this with one pound of unslaked lime. This amount is sufficient for 1000 cubic feet capacity. If the room be larger than this, use larger quantities of the chemicals. This method has the advantage of cheapness, freedom from fire, and does not require any special apparatus. It is very rapid and efficient.

After placing the mixture in the room to be fumigated, close the door tightly and allow the room to remain closed for twenty-four hours; then open all the windows to free it from odor. The room is now ready for occupancy.

If fumigation can be perfectly performed it may be most efficient. Altogether too many conditions militate against its perfect performance. Many health officials are now advocating less fumigation and more disinfection. By this latter we mean the application of the principles of disinfection by the most thorough use of hot water and soap in the cleansing of the woodwork and furniture within the sick room, to be followed by the applica-

tion of an antiseptic solution, as bichlorid of mercury or carbolic acid. Also the boiling of bedclothing and other fabrics and articles as will allow it, and the destruction of trivial objects and papers by means of fire. Above all, the free use of fresh air and sunlight.

Precautions.—Certain precautions are necessary to prevent the nurse from contracting the disease, especially if she has never had it. The nurse should be out of doors as much as possible when off duty. Keep the sickroom thoroughly ventilated; a draft is of great harm to the patient, but ventilation is not only not harmful, but necessary.

The nurse should change her clothing frequently, and also the bedclothing.

Keep the mouth, nose, and throat clean by means of gargle and sprays.

Keep all the exposed parts of the body in as clean a condition as possible.

All secretions and excretions of the patient should be carefully collected and thoroughly disinfected.

A separate set of eating utensils should be used for the patient.

CHAPTER XIII

MEASLES

Measles is the most communicable and frequent of the common diseases of childhood. There is no disease which is more widely disseminated, once it enters a community, than measles. All people, sexes, ages, and classes are about equally susceptible to this ailment. More cases occur in childhood for the reason that most adults are immune because of earlier attack.

Measles is communicable or "catching" from the earliest symptom, three or four days before the rash begins, until the eruption fades away. It is probably more communicable in the earliest stages. After exposure and infection it is usually ten days before the first signs appear and four more days, or fourteen in all, before the rash begins. This is not a hard-and-fast rule, for it may be four days sooner or later than this.

Measles is also known as rubeola, morbilli, Masern (German), and Rougeole (French).

One attack does not necessarily confer immunity; instances of two, three and four attacks are not uncommon. The infection is given off from the mouth and nose in the breath.

Symptoms.—Measles begins as a feverish "cold in the head." The nose discharges, the eyes are watery and irritated, there is some fever, a feeling of tiredness and general languor, sleep is wanting or restless and there is

a harsh dry cough. In fact before the eruption appears, if there is no history of an epidemic or infection, it is difficult to say whether the patient is ailing with measles, whooping-cough or a simple cold or probable bronchitis. The fever in this early stage may become very high and in weakly children and young infants delirium or even convulsions may happen. The cough is very harsh,

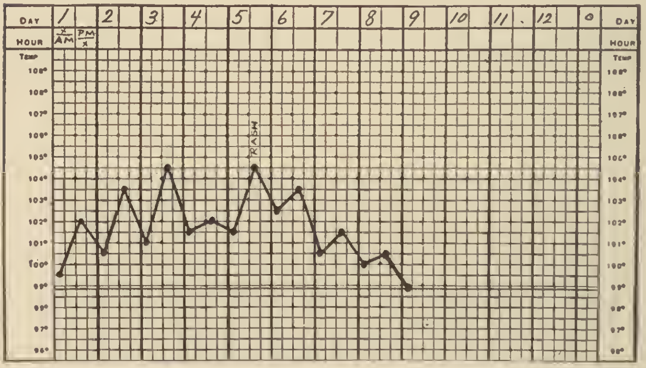


FIG. 14.—Temperature chart of measles.

dry and unproductive. Very little or no phlegm may be expectorated. Soreness and rawness in the chest and throat may result from the harsh cough. In fact, in many cases the cough is the most distressing of the early symptoms. On the second or third day there often appears on the inside of the cheeks, opposite the grinding teeth, small white-blue spots surrounded by a pink or red area, which are quite certain in making sure the disease is measles. These are called Koplik spots after the physician who first described them. The membrane of the throat becomes red and glossy and in the roof of

the mouth, just in front of the uvula, may be seen little raised specks or elevations. These usually occur before the skin eruption.

The *skin rash* usually appears four days after the first symptoms are noticed. The fever which was high in the early stage may disappear before the rash comes, but usually goes high again as the skin breaks out in full eruption. The eruption, consisting of pale pink pimples or elevations, is generally first seen on the forehead just below the hair line or back of the ears and then spreads downward over the face, chest, arms, abdomen and lower extremities. The eruption becomes brighter and may be arranged in groups, taking on a crescentic outline. The rash may be very scant or very profuse. It is hardly ever so abundant but what little islands of natural skin may be seen scattered about, and in this way differs from scarlet fever. The eruptions on the face may begin to fade away before the legs are covered with rash. The face at the height of eruption is swollen and actually looks "boiled," which is very characteristic. As time passes the eruption may take on a purplish hue. During the eruptive stage all the symptoms may be exaggerated. The cough is very discomforting, hoarseness of great degree may occur, diarrhea is not uncommon, the eyes are sore and very susceptible to light and in general the patients feel very "mean" for a day or two. After three to six days the rash disappears and may be followed by a fine floury scaling. All the symptoms gradually decrease in severity and cease.

Measles may occur in a form so light that it is hardly suspected or may occur in a very severe form accompanied by very high fever, delirium, dry cracked tongue, weak rapid pulse, coma and intense nervous symptoms.

Complications in well cared for cases are not frequent but in those not properly attended many disorders may arise, principally bronchopneumonia, middle-ear abscesses, severe eye disease, heart affections and mouth trouble. Tuberculosis is not a rare follower of measles.

Care and Management.—In measles as in all diseases of childhood accompanied by fever the patient should be placed in bed. Small infants should not be carried or held in the lap, but they also should be comfortably put in a crib or bed. The complaint that young children will not remain in bed without crying and fretting is without foundation if they are properly managed. The patient should not be smothered with bedclothing but lightly covered with a sheet and thin quilt or blanket. The temperature of the room should not exceed 65° F. The room should not be dark nor on the other hand extremely bright, but simply shaded. A very dark room is depressing to both patient and attendant and may become one of the factors that urges on complications. The item of prime importance is the ventilation of the sickroom. Give the child plenty of fresh air for in so doing you make him more comfortable, you may shorten the course of the disease and above all may prevent such serious complications as bronchitis, laryngitis and bronchopneumonia. As mentioned in a previous part of this book, all extraneous furniture and fixings had better be removed from the room. The *diet* of the patient is a next consideration. If the patient is a nursing child the strength of the milk should be reduced one-third to one-half. Older children should be placed mainly on milk foods. A feeding should be given every two hours during the day. Milk should first be diluted with water, barley water or vichy. Cereal gruels may

alternate the milk feedings. Albumen water, toast, soft eggs, clam or oyster broths, with milk and custards, may be substituted occasionally. Plenty of water to drink is important. Orangeade and lemonade are agreeable but should not be given near a milk feeding. As the fever leaves and convalescence advances other articles of food may be given. It is well to omit from the diet for some time meats or their products, as soups and broths. A warm sponge bath may be given morning and night with very beneficial results. The warm night bath encourages sleep and restfulness. If the fever mounts high, baths, even cool, should be frequently given. The bowels should move once daily and if there is no tendency toward this a suppository or enema should be employed. The mouth should be kept in a cleanly condition by the frequent use of a mouth wash or gargle. Employ one of the solutions mentioned in the Addenda or as your physician may direct.

For the treatment of the various symptoms you must depend on the attending physician; nevertheless there are some simple procedures which, combined with your physician's services and at his direction, will tend to make the patient more comfortable.

For the distressing *cough* the application of hot fomentations or packs to the upper and front part of the chest and around the neck will often be found very helpful. Also you will find of extreme service for the harsh cough the saturation of the air with steam, which may be best done by means of a bronchitis tent, for troublesome *hoarseness*, the use of an ice-bag to the front of the throat in older children or hot packs for the younger. For *eye irritation* the use of an eye drop four or five times a day is useful. A four per cent. solution of boracic acid

may be employed. For *restlessness*, very material benefit will result from a warm sponge bath. For *diarrhea* in addition to medicine prescribed by the physician, hot scalded milk thickened with arrowroot is good. For *itching*, which may be very annoying, a warm saleratus sponge will often relieve.

Quarantine.—When quarantine is about to be raised, before removing the child from the sickroom he should have a full hot soap bath and an entire set of fresh clothing put on, leaving the old clothing in the room for disinfection.

CHAPTER XIV

GERMAN MEASLES

This disease, although hardly ever requiring the care of a trained nurse, is discussed because of the liability of its confusion with measles and scarlet fever.

Synonyms.—Rubeola, hybrid scarlet fever, French measles, epidemic roseola, and rötheln.

Etiology.—The exciting cause of rubeola is unknown. It is communicable and the epidemics may be widespread and travel rapidly. In small towns it has been known to have entered every household.

It was supposed to be akin to measles and scarlet fever, but a previous attack of either of these diseases will not protect the individual from rubella; neither will an attack of German measles protect from invasion of measles or scarlet fever.

Symptoms.—The course of German measles can readily be divided into four parts, namely, incubation, invasion, eruption, desquamation.

The *incubation period* varies from ten to sixteen days.

The *invasion* is, as a rule, gradual and the symptoms are mild, although the patient may be very ill.

The disease usually begins with malaise, headache, pharyngitis, and rarely with coryza and conjunctival disorders. There may be nausea, vomiting, pains in the back and legs. Enlargement of the glands behind and just below the ears is early, prominent and very

characteristic and may even occur before the rash appears. The throat may be reddened and sore to a greater degree than in measles. The fever for a short time may reach a considerable height. There may be an irritating cough. In many cases all the symptoms are so light that the child hardly appears ill.

The *eruption* usually begins within twenty-four or forty-eight hours after the infection. It makes its appearance first on the face and then spreads rapidly over the whole body. This may be complete in twenty-four hours and is very characteristic. The rash is more pronounced on the flexor surfaces of the limbs. The eruption, which may resemble that of scarlet fever or measles, lasts two or three days and then fades in the order of its appearance.

The *scarlatinal form* is often mistaken for scarlet fever. The rash is of a bright red, but is very uniform and smooth, and *stippling*, so prominent in scarlet fever, is absent. The sore throat is of a mild type, as is also the fever.

The *measly form* is often mistaken for measles. The rash is of a bright red color but the regular crescentic arrangement, so characteristic of measles, is lacking. *Desquamation* is slight and branny.

Diagnosis.—The diagnosis of rubella is made from its mild symptoms, slight fever, the enlargement of the cervical glands, and the rapid appearance and disappearance of the rash.

Prognosis is good. At times, however, the disease takes a very severe course.

Complications of rubella are few. The enlarged glands may soften and become abscesses. Pneumonia, nephritis, and intestinal disorders may occur.

Management.—Rest in bed and quietness for at least one week are essential. Confinement to the bed may be difficult to enforce on account of the mildness of the disease.

Cold or hot applications, preferably the former, to the neck are useful. The patient should be quarantined for at least three weeks.

CHAPTER XV

MUMPS

Mumps or epidemic parotitis is an infectious disease usually occurring in epidemics. The seat of the disease is the parotid gland which is one of the organs that produce saliva. The parotid glands are located on the side of the face just below and in front of the ear. The submaxillary glands, which are located beneath the lower jaw on the sides, may also become involved.

The incubation period, or the time that elapses between the time of infection and the appearance of the first symptom, may vary from fourteen to twenty-one days or even more. The mode of infection is rather directly from the infected person than through a third individual. One attack usually confers complete immunity. The most common age is six to sixteen years and adults are rarely affected, but if so the disease is generally more severe.

Symptoms.—The disease begins with several days of malaise, headache, feverishness, chilliness, sweating, ringing in the ears, neuralgic pains, loss of appetite, and there may be bleeding from the nose. The swelling begins below and in front of the ear, and gradually extends upward and backward, so that the tumor becomes shaped like a stocking. This tumor is tender and accompanied by more or less pain. There is a very tender area behind the angle of the jaw near the tip of the mastoid process of the temporal bone.

It is difficult and painful to open the mouth widely. The saliva is usually scant and the mouth dry. An acid introduced into the mouth causes great pain and discomfort, due to its stimulating the flow of the saliva. Swallowing is painful. The disease often affects both sides and may involve the testicles or ovaries.

The *course* of the disease is from three to six days, but may be extended and complicated.

Complications.—This disease, although generally of a mild character, may be seriously and gravely complicated.

Cerebral disorders, delirium, and coma may occur. Suppuration of the gland, orchitis, mastitis, ovaritis, deafness, pneumonia, endocarditis, and pericarditis are among the other complications.

Management.—The patient should be kept in bed during the acute course of the disease. Liquid diet is about all the patient will be able to take. Mouth washes and gargles are useful.

For extreme pain and tenderness hot applications are very good. If the child will permit, there is nothing more soothing than the application of an ice-bag to the swelling. A hot lotion of lead and opium, locally applied, is useful.

For orchitis, support and protection are sufficient.

Tepid or cool sponging if the fever be troublesome.

The patient should be isolated from other members of the household, especially the children.

CHAPTER XVI

WHOOPING-COUGH

Whooping-cough, also known as pertussis, chin cough, Keuchhusten (German), and Coqueluche (French), is a very infectious disease often occurring in wide-spread epidemics. Once it enters a community it may attack nearly all the non-protected inhabitants. It is very communicable and only a short exposure is necessary to become infected with this disease. The affected person may begin to affect others long before the whoop makes its appearance. It is doubtful whether this disease may be carried in the clothing. A direct contact with the patient's breath is probably necessary, as the germs are doubtlessly in the discharges from the nose and mouth.

After exposure the time to elapse before the disease makes its appearance varies, but it is found that ten to fourteen days is the likely period of incubation.

Symptoms.—The course of whooping-cough may quite handily be divided into three stages, each of about equal length. Of course this is not always the case but in the long run of patients it is quite satisfactory. These three stages each average a length of about two weeks and are the stage of catarrhal symptoms, the stage of whooping, and the stage of decline. The *first symptoms* are those of a catarrhal cold: there is slight fever, tiredness, restless sleep, lack of appetite, also at times symptoms of a "cold in the head" as discharge from the nose, watery and reddened eyes and sneezing are present. The most characteristic symptom of this

early stage is the cough and it is a very annoying and distressing affair. It is unproductive, that is, very little is raised in proportion to the cough; it is dry and irritating and is usually worse at night, thus interrupting the patient's rest. The cough may come on in paroxysms, that is, there are "fits" of coughing followed by periods free from cough. During this stage the whoop is usually absent and unless there are other cases in the vicinity the character of the disease up to this time may remain covered.

The *stage of whoop* follows immediately upon the former stage and is characterized by the peculiar cough; this cough occurs in paroxysms or "fits" and consists of a series or succession of short expiratory efforts until the lungs become practically exhausted of air, when the spasm is relieved and air rushes in with a shrill sound or whoop. The paroxysms may be so severe that the child's face becomes purple and it seems that another breath is impossible, when the "spell" begins to abate by air entering the lungs. During the severe whoops the child may be under a great nervous stress and dread and runs to some older person for aid. Vomiting very often follows the attack and if persistent is serious because of its interference with the child's nutrition. If the attacks are frequent and severe the child is placed under a very great physical strain and quickly becomes exhausted. At times small blood-vessels may rupture and the skin have the appearance of bruise spots. Ruptures have been produced.

The *stage of decline* is simply a decrease and wearing away of the symptoms of former days, especially the whoop which becomes less both in frequency and severity. The child begins to improve in various ways and food

is better retained. The stage lasting about two weeks, makes the average length of the disease about six weeks.

Complications.—Bronchopneumonia is very frequent. Pleurisy, emphysema, pulmonary collapse, persistent vomiting, hemorrhages from the nose and lungs, meningeal hemorrhages, convulsions, and intestinal catarrh are among the complications of pertussis.

Sequelæ.—Pulmonary tuberculosis often follows an attack of whooping-cough, and care to prevent it must be exercised.

Care and Management.—Whooping-cough is a disease of some seriousness and is made doubly so by the fact that it is often complicated by bronchopneumonia and makes the patient particularly vulnerable to pulmonary tuberculosis.

The treatment of the disease with medicines is especially unsatisfactory. A great many drugs have been advocated. Although the nurse has no power to prescribe remedies, nevertheless a partial list of the drugs are appended so as to emphasize the uncertainty of drug treatment.

They are belladonna, antipyrin, acetanilid, phenacetin, quinine, bromoform, bromids, chloral, opium, cannabis indica, amyl nitrite, cocaine, chloroform, resorcin, lobelia, croton chloral, ichthyol, salicylates, etc., etc.

The patient should be kept in a large, airy, well-ventilated room. Plenty of fresh air is absolutely necessary. The breathing and rebreathing of the same infected air prolongs the course of the disease and increases the number of paroxysms. In summer have all the windows open. In whooping-cough the lungs and the mucous membrane of the respiratory tract are very sensitive to cold, and for this reason great care

must be exercised that the patient be not exposed to draughts.

The *diet* is to be liquid and highly nutritious. During the paroxysmal stage vomiting may occur after each fit of whooping. In order to prevent this and to maintain the nourishment of the child it is best to give a very small amount of milk after each paroxysm, instead of larger quantities at longer intervals.

If the disease be seen in the very early stages, it may be abated, shortened, or lessened in severity by spraying the mouth, nose, and pharynx with some germicidal solution. Peroxid of hydrogen gives excellent results when used for this purpose. Prepare a solution of equal parts of glycerine and peroxid of hydrogen and use this, well diluted, as a spray.

If the cough be dry and troublesome, it may be greatly relieved by saturating the air of the room with steam or by employing a bronchitis tent.

A bronchitis tent may be improvised as follows: If the bed posts do not reach a height of three feet above the patient, then fasten to each corner of the bed a stick—a broomstick will do—so that the top of each upright stick is three feet above the patient. Place a sheet over these sticks so as to form a canopy or awning above the child, and so that three sides of the bed are covered, thus forming a tent with a covered top and three sides, one side being open. Under this tent conduct by means of tin pipe or hose steam from a nearby kettle of boiling water.

Belladonna is one of the most frequently used drugs in the treatment of whooping-cough, and probably exerts the greatest benefits. An excellent way of maintaining constantly the action of this drug is by placing

a freshly made belladonna plaster on the back of the patient, preferably between the shoulder blades. The plaster may be renewed every five or seven days.

During the very severe paroxysms, a few whiffs of chloroform are very useful. Pour a few drops of chloroform on the palm of the hand and allow the patient to inhale the vapors from your inverted hand as it is held near the patient's nose.

A mustard paste to the front of the chest is useful in excessive and harsh coughing.

The use of the Kilmer belt has been followed by good results in the author's practice. Although these belts are on sale, one may be improvised at home. Place about the child's body a band of white cotton flannel or woolen flannel, reaching from just below the armpits to the bottom of the abdomen. This should be applied firmly, smoothly and tightly. By this scheme the number and severity of whooping paroxysms may be reduced, and, as a rule, comfort is great and grateful.

Whooping-cough is contagious; therefore, isolation of the patient is as necessary as in other communicable diseases.

Whooping-cough is communicable, therefore isolation of the patient is as necessary as in other communicable diseases.

Vaccine.—A vaccine for the prevention and the cure of whooping-cough has been prepared. Its efficacy has varied in the hands of authorities. Some report excellent results, and others indifferent. It is the general concensus of opinion that the vaccine must be given in much larger doses than is the custom in order to get effective results.

CHAPTER XVII

INFLUENZA

Synonyms.—In the past few years this disease has been so prevalent that its name has become a household term. During the pandemic "flu" seemed to be the most acceptable term. It is also known as la grippe, grip, epidemic catarrh, and catarrhal fever.

Definition.—An acute infectious and at times highly communicable fever occurring sporadically, epidemically, and pandemically, and characterized by severe general pains, great prostration, and involvement of the mucous membranes, especially of the respiratory tract, but also of the alimentary system, and more or less pronounced nervous phenomena.

Etiology.—The exciting cause of influenza has generally been thought to be the bacillus of Pfeiffer. During the recent epidemic it seemed that a streptococcus and at times the pneumococcus might have been the exciting agents. At times the disease is very highly communicable, spreading rapidly through a community, and from town to town. Climate seems to have no particular influence. The last great pandemic reached almost every nook and corner of the earth, carrying with it enormous destruction of human life. The writer personally saw its effects in the South Sea Islands and in India. In this latter country over 6,000,000 lives were taken in a short space of time. We all keenly remember the toll which the monster gathered in our own land.

Between epidemics the disease is doubtlessly maintained by human carriers who harbor the germs in their bodies, probably in the upper respiratory tract. The disease is, so far as we know, spread by means of the discharges from the nose and throat by the so-called "droplet" method. Young able-bodied adults seem most susceptible to the disease. This was repeatedly demonstrated in the last pandemic. Very young children do not seem to be so susceptible and often escape infection. About half of the cases occur in persons between the ages of twenty and forty years.

Epidemics and pandemics seem to appear with more or less regular intervals, with sporadic cases in the intervening periods.

Symptoms.—The incubation period is usually very brief, lasting seldom more than a few days, two to four at the most. The disease signs come on rather abruptly. Severe headache, chilliness, or a distinct chill, malaise, prostration, and loss of appetite often usher in the disease. At other times it simulates a "common cold" for a brief period. As the disease progresses the pains become general and severe, the appetite is completely lost, prostration becomes deeper, and signs of a most depressing malady are easily discerned. There is often a coryza with a beginning dry, hacking cough which often becomes harassing, the eyes become red and watery, the pulse rapid, fever may mount high, bronchitis is prominent, and nervous symptoms—as delirium—are not at all uncommon.

In many instances the typhoidal or nervous symptoms are most prominent, with troublesome sleeplessness, restlessness, intense pains, high fever, delirium, absolute prostration, and cerebral symptoms. At other times the

alimentary tract seems to be selected to bear the brunt of the disease. In these cases nausea and vomiting are disturbing, and diarrhea, abdominal pains, distention of the bowels, and, at times, jaundice form the general picture.

Course.—In epidemics many cases are so mild as to pass unrecognized or are classed with the general "colds," distempers, and other minor maladies. In the average mild case the symptoms rapidly run their course, the pains quickly subside, the fever, which may not have been high, disappears, the respiratory symptoms fade more slowly, and recovery soon takes place. In the severe cases the picture is different. All symptoms are greatly exaggerated and the nervous system is apt to be especially affected, prostration is intense, the heart is greatly taxed, and the respiratory apparatus markedly disturbed. Pneumonia is very frequent and very serious. The course of the disease is greatly protracted and tedious.

Sequelæ.—Influenza is often called the disease of sequelæ. Many of those who have had it realized that it was more difficult and prolonged overcoming the after-effects than the disease itself. Among the common sequelæ are debility, prolonged prostration, functional nervous symptoms, palpitation of the heart, tachycardia or, its converse, bradycardia, melancholia, with its distressing accompaniments. Oftentimes hidden conditions are brought to light. This is especially true of tuberculosis. In fact, influenza so lowers the person's vitality that he or she may easily become infected with other diseases, particularly pneumonia.

Complications.—Foremost and most dreaded of the complications of influenza is pneumonia. This may be of the lobar type, but is more apt to take on the nature

of bronchopneumonia. It may be due to the influenza bacillus, to a streptococcus, to the pneumococcus, or a combination of bacteria. Purulent pleurisy and empyema are not rare and greatly increase the gravity of the case. Meningitis was not uncommon as a complication in the last pandemic. Neuritis, cardiac conditions, phlebitis, middle-ear disease, and herpes zoster are among other complications which may make their appearance.

Prognosis.—In most uncomplicated cases the outlook is cheerful. Convalescence is apt to be slow. Sequelæ are disturbing and not uncommon. Pneumonia, heart complications, and meningitis naturally add greatly to the seriousness of the disease. In the elderly and those weakened by other conditions the prognosis becomes grave. The awakening of other diseases, especially tuberculosis, makes the condition one of a serious nature.

Care and Management.—As in all highly communicable diseases, *isolation* of the patient is needful. This disease is readily transmitted and often rapidly affects all members of a family. The disease is spread mainly by means of discharges from the nose and throat during sneezing, coughing, and forcible exhalation. In time of epidemic it seems that the use of face masks is justifiable. During the writer's stay in American Samoa he was told that the entrance of the disease into those parts was greatly restricted by the enforced use of face masks. During epidemics all non-essential and unnecessary assemblages should be avoided. One should look well after his physical welfare.

The *room* which the patient occupies should be large, airy, and free from unnecessary furniture and hangings. The bed should be comfortable, but not too soft. Eating utensils, dishes, and other ware used by or for the patient

should be kept and cleaned apart from the general household. All *discharges* from the nose and throat, including sputum, should be collected in old cloths or paper and immediately destroyed by fire.

Food should be given freely, but in most digestible form. Milk should form the basis of the diet. Gelatin, custards, cereals, and soft eggs may be gradually added. *Rest* is of utmost importance. It should be demanded early in the attack and continued for a number of days. Upon it may depend the full recovery of the patient. Rest should be complete. For the *fever* the application of hydrotherapeutic measures is much to be desired to drugs. The use of cool sponges, evaporating lotions, and ice-bags will usually control the fever and nervous symptoms. A tepid bath will often allay restlessness. For *headache* and general pains the application of the ice-bag to the head and the electrically heated pad to the back often does great good. *Insomnia* may be relieved in many instances by hot sponge baths, hot drinks, and liberal fresh air.

Local applications to the nose and throat and the use of mouth-washes will keep these parts clean. The use of gargles of weak boric acid solution or permanganate of potash, and atomization of the nose with aqueous or oily solutions will do good. The use of a steam kettle during the time when pharyngitis and bronchitis are troublesome will add greatly to the relief.

Many physicians found that the free use of alkaline drinks made the course of the disease more favorable: weak solutions of sodium bicarbonate or Vichy water. *Cardiac depression* of sudden onset must often be met; strychnin, aromatic spirits of ammonia, or compound spirits of ether may prove useful in an emergency.

Convalescence is slow and tedious as a rule. Continuation of rest into convalescence is necessary. The use of nourishing and stimulating foods help greatly to restore strength more rapidly. The use of massage and electricity helps in restoring wasted muscles. Later a trip to the mountains or shore or a sea trip often hurry complete restoration to health, and aid in overcoming functional nervous sequelæ.

CHAPTER XVIII

EPIDEMIC CEREBROSPINAL MENINGITIS

Etiology.—The cause of epidemic cerebrospinal meningitis is the diplococcus intracellularis. Young children are very susceptible to the disease. It also breaks out in crowded places as in barracks, prisons, etc. Cerebrospinal meningitis is a very serious and often fatal disease. The membranes covering the brain and spinal cord are inflamed. The disease occurs most frequently under the age of nine or ten years. The germ is found in the secretions and excretions of the nose, throat and ears, and by this means the disease is spread.

Symptoms.—The onset of the disease as a rule is sudden. A chill as severe as the initial chill of pneumonia may usher in the disease, followed by severe headache, vomiting, convulsions in the very young, pains in the back, loss of appetite, great irritability, somnolence. The temperature rises to 102°F. or thereabouts, the pulse is at first full and strong and may become very slow, the neck becomes stiff, strabismus develops, and photophobia or dread of light is not uncommon. In severe cases there are, in addition, spasms of a tonic or clonic character, opisthotonos, delirium, stupor, coma, and Cheyne-Stokes respiration. Herpes labialis is of common occurrence.

Petechiæ and purpuric spots may develop in the skin, and it is from this that the disease acquired the name of *spotted fever*.

Course.—There are three types of this disease.

A *mild form* in which the symptoms rapidly occur and in three or four days disappear and a rapid convalescence follows.

A *simple acute form*, characterized by a more or less irregular course of six to fifteen days' duration. The symptoms may be severe but complications are slight or absent.

A *fulminating form* which begins abruptly and with very severe symptoms. The purpuric rash is common and death releases the patient in a very short time.

Complications.—Pneumonia is not an uncommon accompaniment of cerebrospinal meningitis. Pleurisy also occurs. Pericarditis, arthritis, parotitis, and peritonitis may develop. Neuritis, paralysis, blindness, deafness follow complications involving nervous structures. Hydrocephalus, otitis media and mastoiditis, chronic headache, and mental feebleness may result.

Prognosis.—The mortality varies from twenty to seventy-five per cent. Cases of the fulminating type seldom recover.

Diagnostic Points.—Suddenness of onset, severe headache, projectile vomiting, bulging fontanelles, stiff neck, and apathy.

Kernig's sign is of diagnostic importance. To elicit this sign, place the patient on his back and flex the thigh on the body; now, if meningitis be present, it will be impossible to extend the leg on the thigh because of the muscular contraction due to the disease.

Lumbar Puncture.—If a long aspirating needle be introduced into the cavity of the spinal column between the third and fourth lumbar vertebræ, which space is on a level with the crests of the ilia, some of the spinal

fluid may be removed. This fluid is clear in cases of tubercular meningitis, but cloudy in epidemic cerebrospinal meningitis. Culture for detection of the germ may also be made from this fluid.

Lumbar puncture is also one method of treatment.

Care and Management.—As far as the treatment of this disease by medicines is concerned, it has been said that the mild cases need none and the malignant one will not react to medication.

The first requisite is *isolation* of the patient. The room should be large, cool, airy, and well darkened.

The *diet* should consist of milk, eggs, broths, gruels, and predigested forms of beef. Water may be freely given.

The secretions from the nose, throat and mouth should be carefully collected and immediately burned. The dishes of the patient should not be taken from the sickroom, and should only be used by him.

For the *headache*, which is present in nearly all cases and is generally of a severe type, the application of the ice-bag to the head is the only local measure of any merit. Ice-bags to the head and along the spine serve three purposes: they relieve pain and headache; they prevent excessive fever and lower the nervous phenomena, and they retard the formation of effusions.

If the *temperature* be high, cold sponges or baths may be used as in typhoid fever. Warm baths at a temperature of 104°F. have been recommended to lessen the tendency to spasms and convulsions.

Blistering agents to the nape of the neck early in the attack lessen the formation of meningeal effusions.

Vomiting is best treated by thoroughly emptying the bowels and placing the patient on a diet of peptonized milk exclusively.

Convulsions may be stopped by hot baths, and, if very severe, by inhalations of ether or chloroform.

Convalescence is slow as a general rule, but may be hastened by instituting a diet of very nutritious foods, by administering tonics of iron, gentian, arsenic, etc., and by abundance of fresh air and sunshine. The sick room and its contents should be thoroughly disinfected.

Prevention.—Doubtlessly this disease is spread by means of discharges from the nose and mouth of infected persons. These infected persons may not even be ill, but may be apparently perfectly well but harbor the germs in the upper respiratory tract, and are capable of giving the disease to others. We apply the term *carrier* to such a person. During epidemics of this disease healthy carriers exist in great numbers and may outnumber the sick 30 to 1. A carrier may remain infective and thus a menace to the community for four or more weeks. It is just as necessary to isolate the carriers as the sick. They may be detected by making smears from the nose and nasopharynx, which are cultured to determine if the particular germ is present.

All discharges from the nose and throat of patients suffering from cerebrospinal meningitis should be collected on paper or cloths which are to be immediately destroyed by burning.

People in general in time of epidemic should avoid crowds and assemblages of people. They should increase their resistance by the proper use of food, exercise, fresh air, and rest.

CHAPTER XIX

ACUTE EPIDEMIC ANTERIOR POLIOMYELITIS

Synonyms.—Spinal infantile paralysis, infantile paralysis, epidemic poliomyelitis, acute atrophic spinal paralysis, amyotrophic spinal paralysis.

Definition.—A disease occurring chiefly in children, and characterized by an acute febrile onset, with sequential flaccid motor paralysis and muscular wasting, and without prominent sensory symptoms.

No age is really exempt from this disease. Young children are really more susceptible than are the older ones.

Etiology.—This disease usually occurs in children, especially before the fourth year. Both sexes are equally affected. It depends entirely on a specific bacterial origin. In a study of a great number of cases in epidemics nothing certain as to the causative agent has been determined. Harbitz, as a result of the study of nearly 1200 cases of acute anterior poliomyelitis occurring in epidemic form in Norway in the years of 1903 to 1906, comes to the conclusion that this disease is due to a micro-organism whose probable atrium is the digestive tract, and that the nervous system becomes infected either by way of the lymphatic vessels or by the blood current. It is now quite generally believed that the exciting agent of this disease enters the body by way of the nasal and pharyngeal mucous membranes. In these places the germs probably multiply and are directed by the lymph streams and

passages to the central nervous system. The germs or exciting agents may possibly leave the body of the infected person by the nose and throat discharges and the bowel movements. An attack of the disease, so far as we know, confers lasting immunity.

Anatomical Seat of Lesion.—The lesion of this affection, as its name would indicate, is situated principally in the gray matter of the anterior horn of the spinal cord, being most intense in the cervical and lumbar regions. The pathological findings are not entirely confined to the anterior horns, but the pia mater, the pons, medulla, and even the cerebral substance have been involved, but to a lesser extent than the cord. As the anatomical seat of the lesion is principally in the anterior horn, the resulting symptoms expected are those of a purely motor character, with flaccidity, loss of reflexes, muscular wasting, and absence or decrease of electrical response.

Symptomatology.—After an incubation period of two to ten days or more the disease, as a rule, begins abruptly with a rapid rise of temperature, accompanied by nausea, vomiting and diarrhea or constipation. Excessive sweating is often a premonitory symptom of great frequency. Pain is a very common symptom. The acute prodromal period may last from several days to two weeks. The paralysis usually occurs, or, rather, is discovered, on the third or fourth day. It is interesting to note the prodromal symptoms which occurred in some of the prominent epidemics. Collins, in a report of 500 cases in the New York epidemic of 1907, found that 29 per cent. of the cases were characterized by high fever, and that the duration of the fever was from one to four days in a majority of the cases, and very

infrequently longer than one week. Vomiting occurred in about 30 per cent. of the cases, diarrhea in 10 per cent., constipation in 17.6 per cent., retention of urine in 7.4 per cent. of the cases. Fetid stools were noted in cases in which neither constipation nor diarrhea was present. Three symptoms to which especial attention was directed were abdominal paralysis, retention of urine and constipation. The common symptoms were somnolence, stupor, rigidity of the neck, immobility, screaming, and insomnia. V. P. Gibney, in a report of the same epidemics, as a result of studying 100 cases, found diarrhea and vomiting in 19 per cent., vomiting and constipation in 11 per cent. Starr's findings in the same epidemics were that the disease uniformly began with febrile manifestations, and usually with vomiting, general sweating, severe pains in the limbs, with diarrhea on the second or third day. In the epidemic of infantile paralysis which visited New York State in 1916 it was found that certain symptoms were particularly common. Of 121 cases analyzed, 61 patients had high fever, 17 had severe headache, 63 were constipated, 51 were subject to severe vomiting, 65 had pains in the limbs affected, 42 had retraction of the head, and 66 were restless. It is interesting to note the days upon which the paralysis occurred in these cases. In 29 the paralysis was reported to have begun on the first day; in 20, on the second day; 17, on the third day; 18, on the fourth day, and 7, on the fifth day. One case was reported on the twenty-first day. No paralysis was reported in 19 patients.

Motor Symptoms.—Paralysis. Motor paralysis forms one of the most important symptoms of infantile paralysis. The paralysis occurs after or during the abatement of the severe premonitory symptoms, usually in

the course of several days, although it is not rare for these signs to occur very early; the patient retiring at night in a normal condition, and in the morning being affected with an extensive paralysis.

The distribution and the extent of the paralysis varies exceedingly. It may involve only the muscles of a single group, or it may be of the hemiplegia, diplegia or monoplegia type, depending on the extent of damage in the cord. The primary paralysis is generally much more extensive than that which will be permanent. It gradually subsides until only those groups of muscles presided over by the affected areas in the cord remain paralyzed.

From the knowledge of anatomy and physiology of the cord, we perceive that fibers from the anterior root cells leave the cord by way of the anterior nerve roots, and that these roots do not supply single peripheral nerves but, by means of the plexuses, their fibers are distributed to a number of nerves; thus, the anterior horn fibers are found not to supply anatomical groups of muscles, but physiological or like-functionating groups of muscles. Therefore, lesions of the anterior horns of the cord produce a paralysis of synergetically acting muscles, thus differing from nerve and brain lesions which affect anatomical groups of muscles. In anterior horn disease, two contra-functionating muscles lying side by side and supplied by the same nerve are differently affected, the one being actionless and the other normal.

The muscles of the lower extremity are more often affected than those of the upper extremity, the extension muscles being more often paralyzed than the flexors. Collins and Romeiser, in an analysis of 500 cases of spinal infantile paralysis, found the distribution of paralysis

as follows: Leg, 43.2 per cent.; both legs, 26.8 per cent.; arm, 7.2 per cent.; both arms, 1 per cent.; triplegia, 5.4 per cent.; quadriplegia, 6.4 per cent.; homolateral, 4 per cent.; crossed, 2.6 per cent.; cranial nerve, 7 per cent. The frequency of the parts paralyzed: 1—leg; 2—legs only; 3—arm; 4—quadriplegia; 5—triplegia; 6—hemiplegia; 7—contralateral; 8—both arms only. The function of the sphincters are very seldom affected.

Convulsions may occur during the prodromal stage, but are not common thereafter.

Reflexes.—As in all cases of inferior component paralysis, the reflex action is lessened or altogether abolished, depending on the extent of injury to the anterior horn cells of the respective reflex arcs.

Muscle Tone.—As the anterior horn cells preside over the tonicity of the various muscles, an affection of this part of the cord produces a decrease or loss of muscular tone. Flaccidity of the muscles is very characteristic of infantile paralysis. The parts become loose and the joint action flail-like.

Gait.—In anterior poliomyelitis, as the child begins to use the lower limbs in ambulation, a peculiar form of gait is noticed. As said above, the limbs are loose and the joints have a flail-like action; the legs are laxly and passively thrown forward, or may even be dragged along.

Sensory Symptoms.—From the confinement of the lesion to the anterior horn or motor portion of the cord, sensory symptoms are not to be expected, and this is the case, although in the prodromal stage severe pains in the limbs are not uncommon, but are probably due to the febrile or toxic disturbances as in the other infectious diseases—typhoid fever, diphtheria or scarlet fever.

Anæsthesia and other sensory disturbances are exceed-

ingly rare. If the lesion of the anterior horn encroach on the pain tracts which cross in the central gray matter, then painful sensations may occur in the affected parts.

Trophic Disorders.—Muscular Atrophy. The anterior nerve cells preside over the nutrition of the muscles with which they are in relationship, therefore a lesion affecting these cells as does anterior poliomyelitis produces muscular wasting. In this disease the muscular atrophy often reaches an extreme stage.

Bone Dystrophies.—The bones in some cases are also affected. Their growth is retarded and in some cases entirely brought to a standstill. This, together with the muscular atrophy, makes the affected limb much smaller than its unaffected partner, both in length and bulk.

Contractures.—Owing to the weakness of the affected muscles, there is great overaction on the part of the opposing muscles, thus producing various deformities and contractures, such as the various forms of clubfoot, equinus positions, flattened arches, recurving of the knee joint, deformities of the spine and shoulder and wrist.

Owing to vasomotor disturbance, the affected parts are cold, mottled and discolored. Bed sores do not develop.

Electrical Reactions.—As the inferior component is involved, changes in electrical reactions are prominent. The parts very early give a lessened response to faradic stimulation, and the characteristic reactions of degeneration rapidly make their appearance.

Diagnostic Features.—The diagnosis of anterior poliomyelitis, as a rule, should not be exceedingly difficult. Its prodromal febrile onset, followed by a

purely motor paralysis of the inferior component type, should positively stamp it. Characteristic is the paralysis of physiological or like-functionating groups of muscles, with flaccidity, rapid atrophy of the musculature, loss of reflex action in the affected parts, presence of an altered electrical response with the reactions of degeneration, with the absence of sensory symptoms.

Course of the Disease.—The course of this disease varies to a great extent. It may be abortive in nature and seem almost trivial, or it may be fatal within a very short time. In some epidemics 20 per cent. of the cases may die in the acute stage, whereas in other epidemics the acute death-rate may be reduced to one-quarter of this rate. In large epidemics there are so many light or abortive cases that they are not even suspected as being ill of the disease. A large number of those who survive the acute stage recover completely without the least vestige of paralyses. In those who recover from paralysis this condition may have been present from a few days to many months. In an altogether too great a number of cases permanent and crippling paralyses remain as lasting evidences. Although the preponderance of improvement takes place during the early months, progressive but slight betterment may extend over a course of months or years. Maximum of recovery depends largely upon persistent, proper treatment.

Care and Management.—The States of New York and Massachusetts have added this disease to the list of communicable diseases. It may be well to insert here a few excerpts from a circular issued by the New York State Department of Health:

Epidemic poliomyelitis has been added to the list of

communicable diseases, the occurrence of which is required by the State Department of Health to be reported to local health officers, and by them to the department.

Since 1881 medical literature has contained reports of outbreaks of infantile paralysis; during the last five years these outbreaks in several parts of the world have increased in frequency out of proportion to the increased interest shown in the disease. That is, the increased number of reports cannot be attributed wholly to more accurate diagnosis or greater care in reporting the cases.

The disease is found to be more prevalent in cold than in warm countries, and more cases have been reported from the northern part of the United States than from any other part of the world. It occurs mostly in children, but adults have been afflicted. In 1907 there was an epidemic of 2500 cases in New York, the largest ever reported. It generally begins late in the summer, and ends after a few hard frosts in October.

Laboratory workers have already demonstrated that infantile paralysis is an infectious disease, caused by a living organism so small that it can pass through a bacterial filter. It is thought to be most contagious during the early, or febrile, stage of the disease. Most of the laboratory study has been made upon monkeys, who acquire the disease by inoculation of an emulsion of certain tissues from a human being dying of the disease, and from affected monkeys.

With a view to the prevention of the disease, the State Department of Health expects that every case discovered will be quarantined. Some local boards of

health have already passed an ordinance requiring a quarantine in this disease, and such action is approved by the department. The discharges from a patient—stools, urine, sputum—should be disinfected.

The patient should be isolated, in order to protect other members of the family and the community in general. The excretions, especially those from the nose, mouth, kidneys and bowels, should be thoroughly disinfected, as described under typhoid fever. The bowels should be thoroughly evacuated for two reasons: first, constipation is very common; second, whether constipation or diarrhea prevails, the bowel content is often fetid. The result may be attained by the use of castor oil, enemata, or both. The child should be urged to freely partake of liquids, especially water, and if because of vomiting or other reasons sufficient water is not taken, it may be given by the rectal saline drop method, which acts very favorably and increases the functions of the kidneys. The skin may be made active by means of hot packs or hot air baths. At this time the patient should be kept at rest. This tends to bring about the greatest degree of repair in the damaged nervous system and also tends to prevent deformities which might otherwise have occurred. No massage, electrical applications, or physical manipulations are allowable during this period. Keep the legs and back in normal positions to prevent deformities and curvatures.

The diet, as in all febrile conditions, should be light and nourishing. Milk in one or more of its many modified forms should be the basis of feeding. Cereal gruels, albumen, water broths, ice cream, gelatine, and fruit juices may be used to vary the diet.

High fever should be met with one of the many hydrotherapeutic measures described in succeeding chapters. An ice-bag to the head may quiet delirium. A hot bath will often relieve muscular spasm. As the disease progresses from the acute stage into the permanent stage, the use of electricity, massage, passive and active exercise, and baths may be employed to help the return of normal muscular and nerve functions. At this time care must be taken that the child does not overdo. Maintain rest and quiet for an extended time. It is thought by some that in convalescence the upright position is better than the sitting posture. Caution as to overuse of weakened muscles must be practised.

Massage, heat, muscle training, and electrical applications are most useful during convalescence. After a prolonged period, when deformities become fixed, it may be necessary to advise surgical procedures, as stretching under anesthesia, cutting of muscles and fasciæ, transplantation of tendons, etc.

The Great Ormond Street Hospital for Children in London issues a small circular regarding the care of paralyzed limbs, which I herewith add in part:

Clothing.—The paralyzed parts must be kept warm day and night.

Knitted woolen stockings to come up above the knees must be worn.

If these do not keep the limbs warm, woolen overalls must be worn outside the stockings.

The overalls must be lined, if necessary, with cotton wadding quilted to them.

For the night, a flannel sack made the shape of the leg, coming up to the top of the thigh and lined with cotton wadding, is best.

Rubbing.—This must be done for a quarter of an hour twice daily.

Lay the child on a bed.

1st. Rub the paralyzed leg from the foot right up to the top of the thigh. Rub upward only. Put the broad part of your hand on the back of the child's leg. In rubbing the thigh, put your hand first on the back of the thigh, and afterward on the front, but always rub upward, and be sure to go as high as the child's loins. While rubbing with your right hand, hold the child's foot with your left. Use for rubbing any kind of oil.

2d. Take hold of the child's leg with your two hands just above the ankle. Rub around the leg with your two hands in opposite directions, as though you were wringing out sheets. Work up the leg and thigh from the foot to the top of the thigh, in the above manner.

3d. Flip every part of the leg and thigh with your fingers, so as to make the whole of the limb quite red and warm.

Rub gently up and down all over. This will take away the stinging which was left by the last movement.

Baths.—Once a day let a large jugful of hot water, containing two handfuls of salt, be poured down the leg and thigh.

Then pour about half the quantity of cold water over the leg and thigh.

Then rub thoroughly with a towel until the limb is perfectly warm and dry.

CHAPTER XX

LOBAR PNEUMONIA

Definition.—Lobar pneumonia is an acute infectious fever, characterized by inflammation of the lungs, with symptoms of general toxemia. The lesion is due to a specific bacterium—the pneumococcus.

Synonyms.—Croupous pneumonia, fibrinous pneumonia, pleuropneumonia, pneumonitis, lung fever.

Etiology.—The *exciting cause* is the pneumococcus. The pneumococci causing this disease have been divided into four groups. Three of these groups are responsible for over three-fourths of all the cases of pneumonia. The germs are frequently found in the mouths of healthy persons and those convalescing from the disease. These healthy individuals form a class of carriers who become a great menace in those months when pneumonia is most prevalent. The disease may be transmitted from person to person by means of infective discharges from the nose and mouth, and also possibly by objects contaminated with such discharges.

Nasal discharges and sputum of pneumonia patients, even up through convalescence, should be destroyed or thoroughly disinfected.

Predisposing causes are the Fall and Winter seasons, exposure to the elements, cold and rain. Elderly and enfeebled persons are very susceptible. The use of alcoholic beverages to excess, lowering the resistance of the individual, pre-existing diseases as diabetes,

nephritis, typhoid fever, and injury to the thorax may precipitate an attack.

The germ causing pneumonia is said to have been found in the mouths of sixty per cent. of individuals.

Pathology.—The course of the pathologic events are divisible into three stages:

First stage consists of engorgement or congestion of the lung. It lasts from twelve to thirty-six hours. If the patient dies in this stage, the lung will be found very red and when cut the blood drips from it. It crepitates when pressed between the fingers and when placed in water it floats midway.

Second stage or the stage of *red hepatization.* The lung is very solid due to the great amount of fibrinous exudation, and resembles very much the consistency of the liver and is red in color. From these two facts the condition derives its name.

The cut surface of a lung in this stage is granular and somewhat dry. There is no dripping of blood. When placed in water it sinks to the bottom. It does not crepitate on pressure.

Third stage or stage of *gray hepatization.* The exudate of the former stage is now undergoing certain degenerative changes and becomes gray in color and more fluid. When placed in water it floats.

Symptoms.—The onset of lobar pneumonia is usually abrupt. There may be a day or two of malaise, headache and loss of appetite, but as a rule it begins suddenly with a *chill.* The chill is very severe and pronounced, sometimes lasting from twenty to thirty minutes and so vigorous as to shake the bed if the patient be in bed at the time. The *temperature* rises rapidly and to a high point (104° to 106°F.); there is a

sharp *stabbing pain* in the side, especially pronounced on coughing or breathing deeply, and is due to an acute pleurisy.

Cough appears early and is short and suppressed because of the pain it causes. The *sputum* is very characteristic in the first part of the disease. It is scant in amount, very viscid, and of a reddish, rusty color. If the cup in which the patient expectorates be

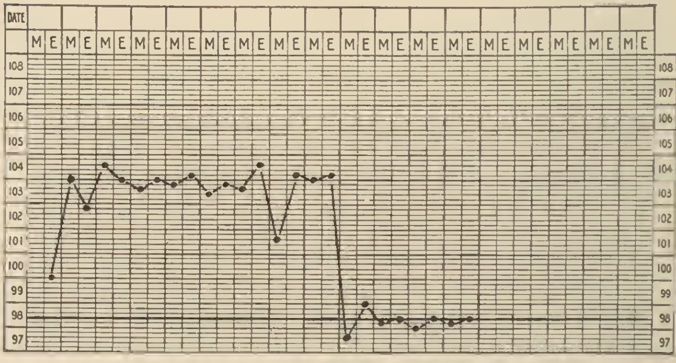


FIG. 15.—Temperature chart of lobar pneumonia.

inverted, the sputum, on account of its viscidness, clings to the walls of the cup and does not fall out.

The *respirations* become very rapid and at times irregular.

The *face* is flushed and the flush is said to be greater on the side in which the pulmonary lesion is situated.

Herpes labialis is very common in this disease. The alæ nasi dilate on inspiration, and the grunt on expiration is more or less characteristic.

The *tongue* is coated, the mouth dry, nausea and vomiting are not uncommon.

The *urine* is scant in amount, highly colored, of a high specific gravity, and contains a small amount of albumen.

Fever.—The temperature, as said above, becomes rapidly high; after reaching its fastigium it usually remains at a common height for a few days, and may then suddenly fall by crisis. Two or three days before the crisis there may be a pronounced fall in the temperature, but it soon reaches its height again. This fall is known as the *pseudocrisis.*

It has often been noted that just before the occurrence of the crisis the patient, who has hitherto been restless, will fall into a quiet sleep—the *precritical sleep.*

The crisis is accompanied by a drenching sweat after which the patient becomes very comfortable.

Nervous Symptoms.—In children and young persons convulsions may usher in the disease. Delirium of an active type may occur, especially in persons of alcoholic habit.

Varieties.—*Infantile Pneumonia.* Instead of beginning with a chill this type in many instances is ushered in with a convulsion. Vomiting is of frequent occurrence. The course is not regular.

Pneumonia in the Aged.—The temperature is not as high as in young adults. The pulse is rapid, feeble, and irregular. The temperature usually falls by lysis. It has been a very common occurrence in the author's practice to have elderly patients who did not cough or expectorate a particle of sputum during the entire course of the disease.

Wandering Pneumonia.—This form moves from place to place. It may start in the lower lobe of one

lung and then migrate to the other lung. If the course be slow and it resolve in one place while it is acute in another, the prognosis is not so bad.

The *typhoid form* is of a nervous type. The tongue is dry, delirium is common, and the usual toxic symptoms seen in typhoid fever are present.

Central Pneumonia.—In this form a patch of centrally located lung is involved. The physical signs are absent at first.

Complications.—Pleurisy is of very frequent occurrence as the dry form. Empyema frequently follows and may be serious.

Pericarditis is not uncommon. I have seen a most grave pericarditis with great effusion follow a pneumonia of a very mild type.

Endocarditis is frequent, especially in pneumonia involving the left lung.

Other complications are meningitis, edema of the lungs, delayed resolution, nephritis, and neuritis.

Prognosis depends on *age;* under twenty months the disease is usually fatal. Between the ages of two and eight years it is favorable if the child be not rickety. It is very favorable in young adult life, but becomes a serious and grave disease in elderly people.

Toxemia alters the prognosis. Severe toxemia is always serious.

Situation.—Central pneumonia is serious and next in gravity is involvement of the upper lobe.

Symptoms.—Active delirium causes exhaustion. Low temperature with rapid pulse is grave. Pulmonary edema is usually a forerunner of a fatal termination.

If the crisis be prolonged beyond the ninth day and

resolution be delayed, be suspicious of tuberculous involvement.

Course.—The disease may terminate by resolution and absorption and excretion of the exudate. Resolution may be slow and delayed but eventually be complete. Chronic interstitial pneumonia may result. Gangrene or abscess of the lung may follow, with fatal termination.

Care and Management.—The germs of pneumonia, as those of tuberculosis, are probably distributed in the dry dust of the air, and thus gain entrance to the respiratory tract of the human organism. These germs, if they be particularly virulent or if the resistance of the individual be lowered, will begin to multiply. It will thus be seen that if a person is to be protected from contracting pneumonia, he must maintain his bodily resistance and not expose himself to such debilitating influences as cold, wet, poorly ventilated apartments, etc.

Pneumonia is a communicable disease. It is spread by means of the sputum and nose and throat discharges. In some years the disease is apparently much more highly communicable than in other years. The nurses, attendants, and members of the family should take every precaution to prevent "taking" the disease. Avoid direct contact with the patient's breath, especially during cough and expulsive exhalation. After giving the patient aid or care wash your hands carefully, especially before you partake of food or attend to your personal toilet. In epidemics showing high degree of infectivity and communicability it may be advisable for the nurse or attendants to wear face masks. The dishes of the patient should be separately cleaned and kept exclusively for the use of the patient. Body and bed clothing

should be disinfected before being sent to the laundry. All nose and throat discharges and sputum should be collected in soft paper or old cloths and immediately burned.

General Management.—The patient should be in a well-ventilated, large room with plenty of air. He must remain quietly in bed and not be allowed to leave it until at least ten days after the crisis. Absolute rest is a necessity of prime importance; the patient is not to exert himself in any way. There are many examples of a sad and fatal ending of a pneumonia patient who seemed in excellent condition, but who, thinking himself strong, moved suddenly in bed and caused a fatal dilatation of the heart.

The *diet* should be light, very nourishing and chiefly liquid. Milk will form the main article of diet and may be supplemented daily with a raw egg or two, albumin water, and some standard preparation of predigested beef. After the crisis semi-solid and solid articles of food may be given gradually.

The *bowels* should be kept open by enemata. If the *temperature* be high, *nervous symptoms* prominent, and the heart action weak, hydrotherapy should be resorted to. Baths should not be given as freely as in typhoid fever. Three or four in twenty-four hours are sufficient. The water used should be about 85° F. or 90° F.

The continuous use of the ice-cap is a most excellent means of applying cold, and is agreeable and comfortable to the patient. An occasional alcohol rub will also serve its purpose.

Sleeplessness is one of the most troublesome symptoms of pneumonia. If the physician does not care to

resort to hypnotics for certain reasons, then local measures must be used. A hot drink, an ice-bag to the head, a mustard foot bath, or a tepid sponge are all serviceable.

For the severe *pain in the side*, usually prominent in the beginning of the attack, nothing is more useful as a local application than an ice-bag. If the patient object to this, a mustard paste may be substituted or hot fomentations.

The *heart* is the one organ on which the bulk of the burden falls. It is to this organ that a most careful vigilance must be directed. If the rate become high, the action irregular and tumultuous, or the rhythm altered, the nurse will understand that the organ is beginning to be affected and the physician's attention should be called to it immediately.

For a tumultuous heart the ice-bag is of most valuable service.

During the *crisis* support and stimulation is of paramount import.

The drugs generally used in this disease for heart stimulation are digitalis, strychnine, alcohol, and atropine. If a very rapid stimulation be necessary as at the crisis, aromatic spirits of ammonia or the compound spirits of ether may be given every hour or two in half-dram doses, well diluted.

If cyanosis and dyspnœa are present, then oxygen may be administered. In profoundly toxic cases, the use of normal saline solution as a hypodermoclysis is very useful.

It may very rarely fall to the lot of a nurse to perform or assist at a *venesection*. This is generally performed on the front of the arm at the elbow joint.

The part is first thoroughly cleaned as for a minor operation. A rubber bandage or tourniquet is placed around the arm above the elbow, causing the veins below to become very prominent. An incision one-half inch in length is made over the site of one of the veins, generally the median cephalic. When the anterior wall of the vein is incised the flow of blood is free, provided the tourniquet is not so tight as to interfere with the arterial supply of the forearm. When sufficient blood has been removed, from one-half to one pint, a sterile pad is placed over the incision and a bandage firmly applied. The dressing need not be removed for five or six days.

Management of Pneumonia in Children.—The care of a child ill with pneumonia differs somewhat from that of an adult. The child should be confined to bed in a large, airy room. The temperature should be equable (about 68° F.). Quiet should prevail; loud talking within the room or in hearing distance of the patient is to be prohibited. Fresh air and ventilation are of prime importance.

Dr. Wm. P. Northrup of New York has said: "If you wish to kill a child with pneumonia, then place the crib in a far corner of the room with a canopy over it. Have the temperature of the room 80° F. Have many gas jets burning, shut the doors and windows, place a large poultice around the child's chest, and have a few friends in the room."

The *diet* should consist of milk only. If the child be very young, the milk should be modified as given in the chapter on "The Diet of the Sick." Special care must be given to the diet. Milk very frequently causes distention of the abdomen which seriously interferes

with the action of the heart. Water should be freely given.

The *bowels* must be evacuated at least once a day.

Fever in a child is not as significant as in an adult. Often it need not be treated, unless it mounts very high or is accompanied by restlessness and nervous phenomena, when tepid sponges and cool packs will be very serviceable.

A thick bath towel is immersed in water at 85°F. to 90°F., and then wrapped about the child's chest and trunk, and a light blanket thrown over the child. If in ten minutes the results are not satisfactory, repeat the procedure, using water which is a little cooler.

Cold and clammy feet are often seen in this class of cases. In these patients a hot foot bath is of greatest benefit. Watch the feet! Counter-irritation to the chest in the form of a weak mustard paste is often serviceable.

Convalescence in pneumonia, as a rule, is very rapid and may be greatly enhanced by nourishing diet and tonics.

CHAPTER XXI

DIPHTHERIA

Diphtheria is an acute communicable infectious disease, always caused by the same germ known as the Klebs-Löffler bacillus. The infection is given off from the patient, principally through the nose and throat secretions, and also by excretions from infected parts, as pus from ear discharges. Diphtheria is given directly by the patient or may be carried by a third person, or may be transported on toys, clothing, and dishes. It may be given by a person not suffering from the disease but who harbors the diphtheria bacilli in his throat. These persons are called *diphtheria carriers*. The disease may be spread by infected milk, the milk obtaining the infection from the pails or hands of the milkers, or the cows may be suffering from the disease in the form of "chapped teats." Children who frequently suffer from common sore throat are more liable to contract diphtheria when exposed. Children between the ages of one and eight years are most susceptible to the disease, and it is a well-known fact that members of certain families are more apt to take the disease than others. By means of the Schick test one may determine who is susceptible to diphtheria and who is immune.

Etiology.—The *existing cause* is the specific bacillus mentioned above. *Predisposing causes* are exposure to cold and wet, tonsillitis, and pharyngitis, which lessen the resistance of the mucous membrane. The time of greatest susceptibility is between the ages of

six months and six years. Adults are not so liable to contract this disease as are children. The force of the infection is not always equal; some epidemics are more severe than others, and some individuals are attacked more vigorously than others.

The bacilli themselves usually remain at the site of the local lesion, but the toxines which they produce are absorbed and give rise to the general toxic symptoms.

The tonsils afford an excellent residence for the germs, as the crypts of the tonsils usually contain material upon which the bacilli may subsist and also provide two important requisites to the multiplication of bacteria, namely, heat and moisture.

At first only a hyperemia of the mucous membrane is produced, but later an exudation is thrown out which sinks into the tissues and is followed by a necrosis of the superficial layers, forming a false or pseudomembrane. Great edema of the parts and abscesses may develop.

This pathologic process just described may occur on any mucous membrane, as of the tonsil, pharynx, larynx, nasal cavity, esophagus, stomach, vagina, conjunctiva, etc.

The membrane is at first gray but soon becomes of a dirty brown color. It cannot be readily removed, and if taken off leaves a raw, bleeding surface.

Degeneration of the nerves, heart, kidneys, and liver are common.

Symptoms.—Diphtheria may affect the tonsils, throat, larynx, nose or even the skin it if be broken. The most common places are the throat and tonsils, the larynx and the nose. Probably the first symptom of which the child complains is soreness of the throat,

especially when he attempts to swallow. Other symptoms may appear three or four days before the sore throat attracts attention, but are usually attributed to other causes until the characteristic throat symptoms begin. Principally among these prodromal symptoms are peevishness, irritability, chilliness and general pains over the body. Sore throat soon occurs but even then it may be thought only a simple tonsillitis. The throat is first reddened, the small specks appear and finally the membrane or skin is seen. This membrane is not confined to the tonsil only, but rapidly spreads over the soft palate, uvula or other parts of the throat. The membrane is at first white and not easily removed or rubbed off as a simple tonsillar exudation usually is. Even though many signs be present, diphtheria may not as a certainty be told until a little of the membrane is examined and the true bacillus or germ is found. The fever continues and as a rule does not go excessively high, often not as elevated as in simple tonsillitis. The glands of the neck, especially those beneath the angle of the jaw, may become enlarged. The urine may get dark and scanty. In small children the breathing is usually noisy. The membrane spreads during the first few days and then begins to loosen and disappear. The course is usually ten days to two weeks. The heart is very susceptible to the poisons of diphtheria and may become permanently damaged. The nervous system is also easily affected and various forms of muscular paralysis occur. Principally among these is loss of power in the muscles of the soft palate and throat and shows itself by inability of the patient to properly swallow; liquids instead of passing down into the stomach come back through the nostrils, also he loses the ability to gargle

and "spells" of choking may occur. Paralysis may affect the larynx and produce changes in the voice, even extending to complete loss of voice. The eyes, arms and legs may become involved.

Diphtheria of the Larynx.—Next to diphtheria of the throat or fauces, which has just been discussed, diphtheria of the larynx is most frequent. This condition is also known as *true membranoüs croup*, but should not be confused with simple croup or spasmodic laryngitis. Laryngeal diphtheria may begin as such or, as is more frequently the case, it follows the throat diphtheria. The first sign to direct one's attention to this disorder is the quality of the voice. The voice may become husky, hoarse or weak. A peculiar brassy quality is very common. A whisper may be all that the patient can possibly effect. Another characteristic is the laryngeal stridor, which is a sound hard to describe, being like air forced through a narrow place. Breathing may become very difficult. The other symptoms are similar to those of pharyngeal or throat diphtheria. Laryngeal diphtheria is much more serious than the simple pharyngeal form.

Diphtheria of the nose is the third frequent form of diphtheria. This may occur alone but usually accompanies one of the other forms. There is an abundant discharge from the nostrils of a pus or blood combination. The skin over which the discharge passes soon becomes red and irritated. Other general symptoms are like those of pharyngeal diphtheria.

Diphtheria may run a very mild to a very severe course. At the beginning of the disease it is impossible to say what will be the result. A simple pharyngeal form may progress into a most grave laryngeal form with

many complications. However, since the entrance of the antitoxin treatment the mortality from diphtheria has fallen very greatly; in fact, nowadays we very seldom see the malignant forms of this disease that were common before the days of antitoxin.

Complications and Sequelæ.—*Hemorrhages* may occur in the skin, kidneys, or nose, due to a fatty degeneration of the vessel walls.

Pneumonia is a very common complication.

The toxines of diphtheria seem to have an especial affinity for the *heart* and cardiac degenerations are of frequent occurrence.

The *kidneys* are also attacked by the toxine and Bright's disease often complicates diphtheria and shows itself by an increase of albumen in the urine, and the presence of casts and blood.

The enlarged *cervical glands* may soften and ulcerate.

The most important sequelæ are the nerve degenerations with their accompanying paralyses. The nerve sequelæ occur, as a rule, after convalescence has advanced for two or three weeks.

When the nerves of the pharynx and surrounding structures are involved there results a series of characteristic paralyses. The muscles of the pharynx and soft palate, as a rule, are the first to suffer. The voice takes on a nasal tone, food given by the mouth regurgitates through the nose, swallowing is difficult and impeded.

Other nerves of the body are also affected. There may be strabismus, ptosis, loss of power of accommodation, and facial paralysis may occur. The muscles of the neck may be affected and weakened, when the head will lean to one side or roll about on the shoulders.

The upper extremities are rarely involved.

The legs may be affected and the knee jerks diminished or lost.

Prognosis.—This depends on the early use of antitoxin and the complications. Before the use of antitoxin, the mortality was from forty to seventy per cent.

Mortality of cases treated with antitoxin on first day, 1 per cent.

Mortality of cases treated with antitoxin on second day, 4.3 per cent.

Mortality of cases treated with antitoxin on third day, 14.2 per cent.

Mortality of cases treated with antitoxin on fifth day, 19 per cent.

Involvement of the larynx, complications of the heart and kidneys are very grave.

Transmission.—The excretions from the nose and mouth are loaded with infection. Therefore, they should be carefully collected, and not thrown on the carpet or placed in handkerchiefs and allowed to lie around. These excretions when dry become pulverized and are then suspended in the air and inhaled, thus spreading the disease. During the coughing spell the excretions may be discharged into one's face.

The infection may also be conveyed on eating utensils, pencils, clothing, etc. The germs may linger in the throat for weeks after the disease subsides.

Care and Management.—After the administration of the antitoxin there is little to be done besides preventing the spread of the disease, treating the disease locally, attending to the comfort of the patient, and being prepared to combat complications should they arise.

Prevention of the spread of the disease is very important. It is hardly necessary to say that absolute isolation of the patient is the first requisite. Members of the family are not to be allowed in the patient's room. Children in the same house with a patient suffering from diphtheria are not to attend school. All persons in the house, or those who have been exposed to the disease, should be immunized by small doses of antitoxin (500 units). If objection be made to this, then at least those who have never had the disease should be protected by this immunizing dose of antitoxin.

The room in which the patient is to lie should be large, airy, light, and capable of being ventilated. If a room with a fire-place can be used, it would afford better ventilation. All furniture, hangings, etc., that are not essential to the comfort of the patient and nurse should be removed. A comfortable bed, a large table, and one or two chairs are all the furniture necessary.

The temperature of the room should be kept equable, at about 65° F. Avoid having the patient exposed to draughts. A separate set of eating utensils should be used in the sickroom.

Allow no uncovered dishes of food or medicines to remain about the room. When the patient has drunk all the milk he cares to, do not place the glass containing the residue of milk on the table, but remove it at once and cleanse it.

Always have a basin of some antiseptic solution handy, preferably corrosive sublimate solution (1 to 1000).

Keep the floor and furniture scrupulously clean. If dishes are washed in the general kitchen, they should

be thoroughly immersed in a strong antiseptic solution before leaving the sickroom. Do not place metallic dishes, etc., in solutions of corrosive sublimate.

Bedclothing and the patient's gowns should be frequently changed. Soak well in a strong antiseptic solution before sending them to the laundry.

One person should care for the patient and all others, excepting the medical attendant, should be excluded from the sickroom. The person in charge should not mingle with other members of the household; as in all contagious diseases, visitors should not be admitted to the house, nor members of the household allowed to visit others.

A few words to the *nurse* about the protection of herself will not be here misplaced. Always immerse your hands in an antiseptic solution after attending to the patient. If it be required of you to make local applications to the throat or nose of the patient, be very careful as you are on dangerous soil. It is well to hold, or have held, a large square of glass (at least twelve inches square) between your face and that of the patient when making applications. When the patient coughs, which he is liable to do when you are making local applications to the throat, myriads of the germs may be expelled.

Spray your nose and throat frequently with some antiseptic solution. Do not sleep or eat in the patient's room. Wear only clothing that may be easily laundered.

The *diet* is the same as in any acute febrile disease, namely, milk, gruels, broth, etc. It is very important that food be given regularly and that the patient get a sufficient quantity, as the whole system is greatly depressed and nourishing and easily assimilated food

will help the system to overcome the action of the toxines.

The same care must be exercised in regard to the excretions and secretions as in typhoid fever. In diphtheria the excretions of the nose and throat are of special importance as they are exceedingly virulent. Soft linen cloths or pieces of old muslin should be used for collecting the nasal and pharyngeal secretions. These cloths when soiled must be burned immediately and no attempt should be made to wash and use them again. Do not use cups for collecting the sputum, for in expectorating in a cup more or less of the material is sprayed into the air.

Local Treatment.—It is very important to keep the mouth, nose and throat scrupulously clean. This may be done by the judicious use of antiseptic solutions in the form of spraying, atomizing, swabbing, gargling, and douching. Solutions to be used for this purpose are numerous: boric acid, four per cent.; potassium permanganate, 1 to 2000; and peroxid of hydrogen, 1 to 8.

Local applications to the false membrane itself was a prominent part of the treatment before the days of antitoxin, but they are seldom employed now.

General Treatment.—The administration of diphtheria antitoxin holds first place by far in the general treatment of this disease. The initial dose of the antitoxin must be of sufficient quantity. At least 3000 units should be administered and repeated at short intervals until the required action is obtained. The danger is not in giving too much, but in giving too little.

The use of antitoxin should be followed, in at most twelve hours, by a decrease in the severity of all symptoms. The temperature is lessened, restlessness is

quieted, sleep is oncoming, and the patient becomes brighter. The local manifestations of the disease show improvement, the swelling and edema of the mucous membrane are lessened. The edges of the false membrane begin to retract and to quickly disappear.

The duration of the disease is shortened and the prognosis is greatly brightened. If any organic changes have taken place in the nerve fibers or the heart, these are not repaired by the giving of antitoxin, but their advance may be checked.

Certain *ill effects* of but minor importance sometimes follow the administration of antitoxin, and are due not to the antitoxin, but to the horse serum of which it is composed. The nurse should bear in mind these ill effects so that if they occur, she will understand their cause.

These complications may appear in the form of a rash, which is an erythema in character and may resemble the eruption of scarlatina or of rubeola; or it may be of an urticarial nature appearing as small wheals like a mosquito bite, and may itch. The rash may occur within ten minutes or many days after the injection of antitoxin. A complication may occur in the joints, characterized by swelling of the joint and more or less pain. The temperature may mount very high.

These ill effects are not dangerous but, unless expected, may cause some confusion.

Method of Administration of Antitoxin.—The site of injection is elective: the femoral or gluteal regions, or preferably in the interscapular space. The area should be well cleaned with soap and water and then treated with an antiseptic solution and rinsed with sterile water to remove the antiseptic. Some physicians simply

clean the area with alcohol. The syringe and needle with which the antitoxin is to be given should be sterilized. At present all the larger manufacturers of antitoxin provide a sterile syringe and needle with the serum. The needle should be inserted as is a hypodermic needle, but more deeply, and the serum slowly injected.

Fever, if high, is treated with cold sponges and baths as in other febrile disorders.

The *soreness of the throat* and neck is best relieved by the application to the neck of an ice-bag. Small pieces of ice in the mouth are very useful in older patients.

For *swollen glands* apply an ointment of ichthyol or belladonna.

In *laryngeal forms* the air of the sick rooms may be moistened by means of a steam kettle; or filling the room with the vapors from ten grains of burning calomel is useful.

In the *nasal form* the nose should be irrigated with normal saline solution.

Intubation was employed to a considerable extent before the days of antitoxin. It is well for a nurse to know how to prepare a child for the operation, so in case she be called upon she will be acquainted with the methods.

Fold a sheet or blanket until it is just wide enough to extend from the chin of the child to the feet. Wrap this about the patient so that the whole body except the head and neck is included. Have the arms of the child extended along the side of the body before applying this binder. The sheet should be applied somewhat tightly to prevent the child from struggling with the arms and legs. Pin the binder snugly, but do not have

a bulky roll at the upper end as it will interfere with the operator.

The nurse sits upright, preferably on a stool, placing the child's wrapped legs between her knees and holding them very firmly in this position. With her hands the nurse grasps the child's elbows, having the head resting against her left shoulder. The object is to thoroughly immobilize the child without interfering with its respiration or the operator's field of work.

Another nurse stands behind the child and grasps its head firmly between her two opened hands; with her left hand she also steadies the mouth-gag which is placed in the child's mouth on that side. The patient is now in the best position for intubation.

Feeding the intubated patient is the next perplexing problem. Swallowing is more or less painful and difficult. Particles of food often enter the larynx and cause not only severe fits of coughing, but may also cause an expulsion of the tube during the paroxysm.

There are several methods of feeding an intubated child. In the first method the child's head is placed lower than the level of the body and then fed slowly. Place the child on its back across the lap of the nurse with its head low. This may be accomplished by having a pillow under the child's buttocks, or by the nurse raising her knee on that side. Then feed the patient either with a spoon or from a nursing bottle. This is very awkward to the child at first, but it soon learns to swallow without difficulty or coughing.

A second method is by passing a small rubber catheter through one of the child's nostrils, down the esophagus into the stomach. Care must be taken that the catheter does not enter the larynx and intubating tube. With a

small funnel inserted into the free end of the catheter, milk can be easily introduced into the stomach.

If both of these methods fail, then rectal alimentation must be employed.

Quarantine.—The patient should remain in bed ten days after the disappearance of the membranes, when the throat is examined for the presence of the diphtheria bacilli, which, if found, will prolong the period of quarantine. If none are found by repeated examination, and all symptoms have disappeared, the child may be permitted gradually to resume its former mode of life.

The room, all its contents, and the clothes of both patient and nurse must be thoroughly disinfected. For the method of disinfection see the chapter on Scarlet Fever.

The Schick Test.—By the performance of this simple test we are able to ascertain if a person so tested is liable to "take" diphtheria on exposure or if he is immune or safe from the disease. The Schick test is very easily applied and the materials for the test may be obtained in most drug stores. Although the test may be easily applied it must be done accurately in order to get true results. The immunity of a person to diphtheria depends upon the presence of antitoxin in that person's blood. We have ascertained that most persons under six years of age do not have sufficient natural antitoxin in the blood to protect them against diphtheria. The greater the age of the person above six years, the less liable is that person to "take" diphtheria.

The Schick test consists of injecting *into* and not *under* the skin a minute quantity of diphtheria toxin. It is very important that the drop of toxin mixture be injected *into* the upper layers of the skin. If this is

properly done a small wheal or white lump like a mosquito bite will result. If no antitoxin is contained in the blood of the tested person the injected toxin will cause within ninety-six hours a characteristic local reaction at the site of injection and the test is called *positive*, which means that the person is liable to "take" diphtheria on exposure. If, on the other hand, there is sufficient natural antitoxin in the blood of the tested individual no characteristic reaction occurs and the person is immune to diphtheria.

The *positive reaction* consists of a red and thickened area at the site of injection. This may remain for many days. The spot eventually desquamates or scales and is followed by a persistent brown discoloration. A *negative reaction* means that nothing follows the injection. At times a false or *pseudoreaction* results. This reaction is apt to be more extensive than the true positive reaction and disappears quickly, usually within four days. There is no subsequent scaling and discoloration.

The injection is best given on the front of the wrist. Always use the left wrist for the true injection and at the same time make a *control test* on the front of the right wrist by an injection of heated or inactivated toxin. This is helpful in separating false and true reactions.

The details of mixing and applying the toxin mixture may be found on the printed slips or labels of the outfit.

Prophylaxis.—Persons found susceptible by means of the Schick test may be rendered immune by the use of the toxin-antitoxin mixture (T. A.). It has been shown by extensive application that a lasting immunity to diphtheria may be gained by susceptible persons by repeated inoculations of a mixture consisting of diphtheria toxin and antitoxin. It takes one or more months for

the immunity to develop. When once developed it lasts for an indefinite time. It is supposed that the immunity will persist for years if not for a lifetime. No deleterious results have been noted after inoculations. Three inoculations at seven- to ten-day intervals are usually given. The presence and persistence of immunity may be determined by subsequent applications of the Schick test.

CHAPTER XXII

ACUTE ARTICULAR RHEUMATISM

Etiology.—The exciting cause of the disease is at present unknown. It is supposed to be of bacterial origin.

Predisposing causes are exposure to cold and wet especially; it is more prevalent in damp seasons and after prolonged dry seasons. Early adult life is a predisposing factor, particularly between the ages of ten and thirty years. Occupations which expose the individual to the elements excite the disease, which at times seems to occur in epidemic form. Most cases are seen in the latter part of Winter or Spring.

The disease is thought to be caused by a germ because it begins with symptoms generally connected with the acute infectious diseases, as sore throat, malaise, headache, etc.; because there is a tendency to relapse; because it occurs in epidemic form; because the symptoms and complications resemble those of bacterial diseases; and, finally, because it is usually accompanied by anemia.

Reasons for believing it not to be due to germs are: no germ has been found; it has a hereditary tendency; it recurs in the same individual.

Another theory ascribes its cause to a toxemia due to the presence of acetic acid or uric acid in the blood, and another holds it to be of nervous origin.

Allies of rheumatism are chorea, follicular tonsillitis, and torticollis.

Symptoms.—The disease may be ushered in gradually by a few days of discomfort, malaise, loss of appetite, and other indefinite symptoms; or it may commence suddenly with a chill or chilliness. Sore throat and tonsillitis are frequent forerunners of acute rheumatism. They occur in from thirty to sixty per cent. of cases. In the course of a few days the joint symptoms begin to make their appearance. The joints which are attacked become very painful, and redness and swelling of the affected joints soon appear. The joints become exquisitely tender and even the weight of light bedclothing can not be borne. The tissues about the joints may be greatly swollen, or even the whole limb.

The *pain* is excruciating and is produced by the slightest movements. One characteristic is the rapid migration of the joint symptoms.

The *temperature* varies from 102°F. to 103°F., but may reach a very great height. Hyperpyrexia is not uncommon in acute rheumatic fever. The pulse becomes rapid and may be irregular.

A very characteristic symptom is the profuse, drenching *sweats*. The perspiration is acid and has a sour, foul odor. The temperature falls after the sweat. Miliaria and sudamina are of frequent occurrence.

The *tongue* is coated, the bowels are constipated, and the appetite is lost.

The *urine* becomes very acid, scanty in amount, dark in color, high in specific gravity, and contains an abundance of urates. The person becomes very anemic due to an alteration of the blood by the toxic substance.

Complications.—Endocarditis, pericarditis, and myocarditis are the principal cardiac complications. Of

these *endocarditis* is the most frequent and most serious. The mitral valve is usually affected. Small vegetations form on the line of closure of the valves. In these vegetations germs have been found. Rise in temperature, palpitation of the heart, and change in the pulse character will denote the onset of this complication.

Pericarditis may be of the dry or moist form. The moist form may be serous, purulent, or hemorrhagic. It may develop at any stage of the disease. Heart complications are known to have developed before the joint symptoms have appeared.

Pleurisy with effusion of one or both sides may occur.

Other complications are hyperpyrexia, meningitis, delirium, convulsions, coma, chorea, pneumonia, nephritis, eyrthema nodosa, purpura, and hematuria.

Course.—In mild cases the joint symptoms disappear in two or three days, the temperature falls but the sweats may continue. Relapses are frequent and point to an infectious nature. Hyperpyrexia, meningitis, and heart complications are unfavorable. Death may occur suddenly, due to myocarditis. The disease may become subacute or chronic.

Care and Management.—The room in which the patient is confined should be airy and well ventilated. Absence of draughts of air is very essential. The temperature of the room should be kept constantly at or near 68° F.

The *patient* should wear a light flannel gown and undershirt, as flannel absorbs moisture very easily and will protect the patient from the cold. The patient for the same reasons should sleep between blankets and not sheets.

The *diet* is to be liquid. Milk will form the bulk of the diet during the acute stage. If whole or undiluted milk does not agree with the patient, it may be diluted with Vichy, barley water, limewater, or even plain water. Buttermilk, skim milk, albumin water may form part of the diet. No meat or meat preparations should be given during the course of the disease.

Thirst is as a rule constant and great. It may be relieved by providing water freely. Lemonade, oatmeal water, and seltzer water are allowable.

The basis of all *medication* is salicylic acid or some of its salts, the salicylates. These preparations are more or less disagreeable to take and may upset the stomach. The patient will consider it a favor if these medicines be administered in an agreeable form. The salicylates may be given dissolved in milk, or dissolved in milk and peptonized, forming a curd or sort of a salicylized junket. Another palatable form is prepared by dissolving the drug in water and adding some glycerine.

Local Measures.—These are without number. Of all applications there are three or four which I have found of special service. First and foremost the *ice-bag*. Even the mentioning of this to the patient will make him shudder. He will even rebel against it. It may require a little diplomacy on the part of the nurse to carry out this method, but after the first application the patient does not object as the results are very gratifying. Do not place the bag next to the skin but have a piece of woolen cloth intervene.

Second, an application consisting of one dram of salicylic acid, one ounce of oil of wintergreen, and up to eight ounces of cotton-seed oil.

Third, a twenty or fifty per cent. ointment of ichthyol, the base of which is lanolin.

Fourth, a preparation consisting of one part of guaiacol and three parts of glycerine.

Other external applications are methyl salicylate; lead and opium wash; Fuller's lotion (consisting of sodium carbonate, one ounce; tincture opium, one ounce; glycerine, three ounces; water, twelve ounces); chloroform liniment; tincture of iodine; sulphur powder; and vinegar.

Fever is treated the same as in other febrile diseases, by the application of cold in the form of sponges, packs, and baths.

Delirium is quieted by hydrotherapeutic measures. It is important to remember that delirium may result from the exhibition of salicylic compounds. A patient of the author's, seen for the first time at the end of the first week of the disease, had had no delirium. Within twelve hours after beginning salicylates the man became very delirious. The delirium ceased with the withdrawal of the salicylates but returned when the medication was again instituted.

Careful attention must be paid to the *heart* as this organ is often profoundly affected in rheumatism.

Convalescence.—The patient is not to get out of bed until the temperature has been normal for a week, and not even then if any heart complications are present. The diet is to be gradually increased until full diet is resumed. Meats, especially the red ones, are to be but sparingly given. Special care must be taken to avoid exposure to cold and wet. Light massage of the joints and muscles is beneficial.

CHAPTER XXIII

MALARIA

Etiology.—The word malaria is derived from two Latin words meaning bad air. At one time, and by some people at the present time, malaria was thought to be due to bad or foul air, especially that arising from swampy or marshy places. A person may live in a marsh or swamp for a lifetime and not contract malaria. This disease is caused by a microscopic animal, the Plasmodium malariæ, discovered by the French scientist Laveran in the year 1880. This organism does not get into the person as do disease bacteria by the air, food, drink, or by contact. So far as we know the only way that this organism may enter man is by way of the mosquito. It is thus that malaria is spread from person to person. Not all mosquitoes carry the malarial plasmodia. The anopheline type of mosquito is the sole means of dissemination of this disease. This type of mosquito may be distinguished from other mosquitoes by the spotting and marking of the wings; by its resting attitude, the body hangs away from the surface upon which it rests. This mosquito is sometimes called semiwild, whereas the yellow-fever mosquito is more of a domestic insect. The malaria mosquito breeds in most any accumulation of water, as ponds, puddles, marshy lands, and swamps. It bites mostly in the late afternoon and at night. The female sex only will infect man. The male of the species is a vegetarian and lives on the juices of plants and fruits and does not attack man. The mosquito becomes in-

fested with the malarial organism through the blood of an infected person. It is not possible for the insect to immediately infect another person, but can do so only

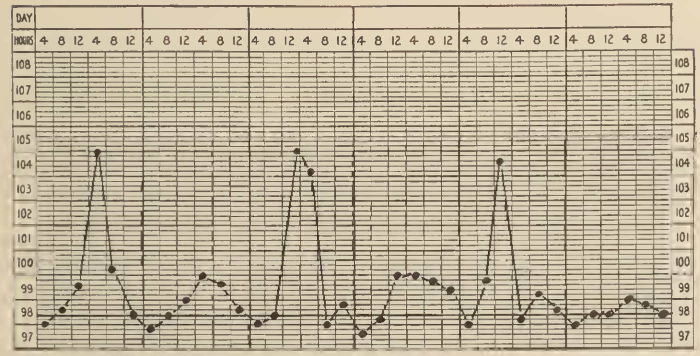


FIG. 16.— Temperature chart of intermittent malaria (tertian).

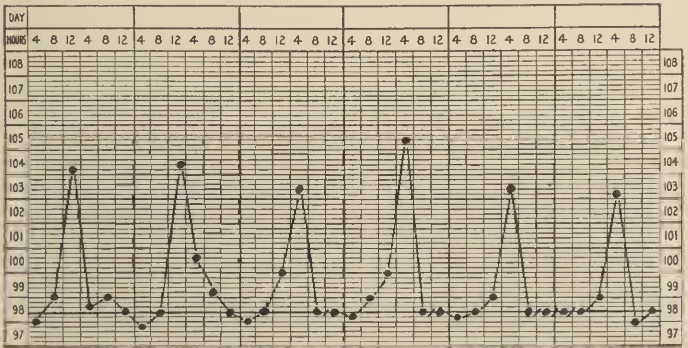


FIG. 17.— Temperature chart of intermittent malaria (quotidian).

after the lapse of ten or twelve days. After man is inoculated from ten to twenty-one days will pass before signs of the disease will manifest themselves.

Synonyms.—Ague; chills and fever; intermittent fever; remittent fever, and paludism.

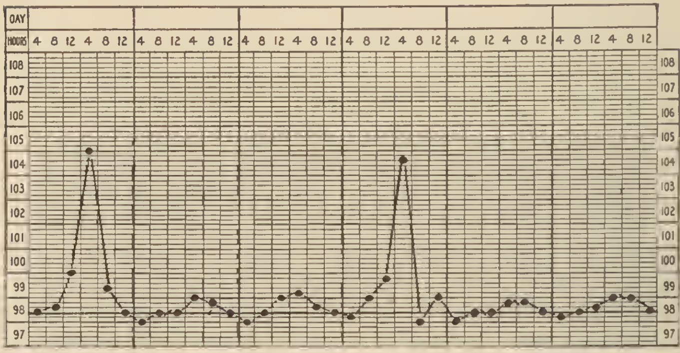


FIG. 18.—Temperature chart of intermittent malaria (quartan).

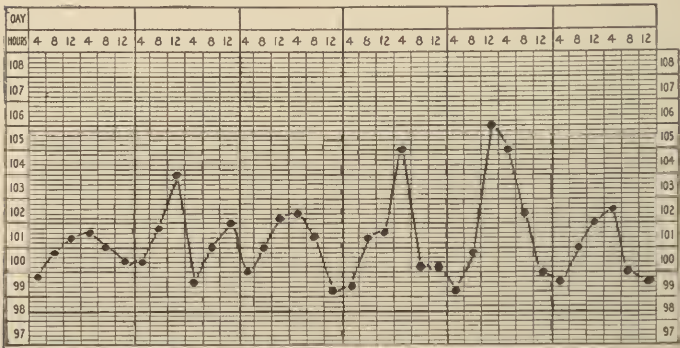


FIG. 19.—Temperature chart of remittent malaria.

Symptoms.—The disease may begin very abruptly or it may be preceded by a week of indeterminate symptoms, as malaise, feverishness, loss of appetite, backache, general pains, and gastric disturbances.

The general course of the symptoms varies with the type of the disease. Three distinct forms may be described: the tertian, the quartan, and the estivo-autumnal or irregular tertian.

Malarial Paroxysm.—This may be divided into three stages: the chill or rigor, the fever or hot stage, the sweating or sudoral stage.

The rigor or cold stage begins usually with chilliness which extends into a pronounced chill often of great severity. The body may vibrate or shake extremely, the teeth chatter, the face is pinched and pale, and the extremities become very cold. The chill may last for an hour or more. The excretion of urine is greatly increased. Headache and pains in the limbs are common. The pupils are dilated. The pulse is small. Although the patient may feel very cold the bodily temperature may mount as high as 104° or 105°F.

The cold stage is succeeded by the hot stage. The skin loses its paleness and becomes flushed; the small pulse becomes full and bounding; the sharp headache takes on a throbbing character; the urine decreases in amount, and restlessness is the rule. Instead of a desire for heavy coverings the patient now endeavors to get rid of all protection. The fever continues high.

The dry, burning condition of the skin is followed by the excessive outpouring of perspiration. The body really is drenched. The bedclothing becomes actually saturated with moisture. The pains and aches complained of in the former stages are now bearable or entirely disappear. The pulse becomes slower and a general sense of well-being exists. The patient may now enter refreshing sleep. The fever falls. This is the sweating or sudoral stage.

The whole paroxysm lasts from two to fifteen hours. Throughout the paroxysm the spleen remains enlarged and tender, and the abdominal viscera congested. Herpes of the lips are common. The tongue is usually heavily coated. During the first two stages fever is present. It begins with the chill and continues until the sweating stage is well established, when the temperature falls. In the tertian type the paroxysms recur on alternate days; in the quartan type, on the fourth days; there may be various combinations, as double quartan, or a mixed tertian and quartan.

Remittent Form.—This type of malaria is also known as bilious remittent fever, estivo-autumnal fever, and malignant tertian malaria.

The onset is usually insidious or gradual. The course is more or less continuous and of a typhoid character. Chill or chilliness may initiate the attack. Severe headache and pains in the limbs, nausea and vomiting, general malaise, followed by nervous symptoms, as delirium with later prostration, are common. The fever is of the remittent rather than of the intermittent type. An afternoon rise with a morning fall of temperature is the rule.

Pernicious Malaria.—This term is applied to a very severe and serious form of the disease. It may succeed any of the described types, especially the estivo-autumnal form. There may be three distinct forms: the algid, the comatose, and the hemorrhagic.

The Algid Form.—As the name would indicate, this form is characterized by the coldness and low temperature. Vomiting is frequent, prostration is very great, the pulse is rapid, feeble, and small; the temperature may be subnormal; the urine is suppressed, very dark,

jaundice is characteristic, and collapse may follow an exhausting diarrhea.

The Comatose Form.—The chill is of short duration or absent. The skin is hot, the temperature is high. The nervous symptoms are marked. The delirium is followed in many cases by coma and death, or the unconsciousness may last ten or twelve hours and then cease. A second paroxysm is generally fatal.

The Hemorrhagic Form.—This form is characterized by the tendency to hemorrhage from the mucous membranes and the kidneys. There are no febrile paroxysms, hematuria is common, jaundice is not as marked as in the algid form.

Chronic Malarial Cachexia.—After repeated attacks of malaria a condition of a chronic nature may persist. This is characterized by great enlargement of the spleen, chronic anemia, edema of tissues, tendency toward hemorrhages from the mucous membranes, and general decline. The skin becomes sallow, the body may emaciate, swelling of limbs due to edema may occur, purpuric or hemorrhagic spots of the skin are not uncommon.

Prognosis.—The outcome of the tertian and quartan forms is usually good. These forms respond quite well to proper treatment. Regarding the estivo-autumnal form the outlook is not always cheerful. It may lead into the chronic cachexia or into the pernicious form, which is always serious.

Care and Management.—*Prevention.*—Malaria is transmitted by means of the mosquito, which insect also acts as the intermediary host. The prevention of malaria depends on one or more of three conditions: the eradication of the mosquito, prevention of the bite of the mosquito, or cinchonization. The mosquito may be eradi-

cated by the destruction of its breeding places. Swampy land should be properly drained. Slow-flowing streams should have their banks cleared of vegetation. Low ground should be filled. Small collections of water should be treated with crude petroleum or may be stocked with small mosquito-destroying fish. Prevention of the mosquito bite may be brought about by screening all openings of the house and by the use of a bed net. All persons ill with malaria should be kept under nets while in bed. Certain substances are said to repel the mosquito. The author's experience in the tropics tends to lower the opinion of the efficacy of such agents. Cinchonization or the use of quinin in small doses to prevent malaria is employed extensively. Persons entering malarial districts will find frequent and small doses of quinin of great value. Three to 6 grains may be taken after meals, or large doses, as 15 grains, may be taken once in ten days.

General Management.—In the intermittent form of malaria the patient must be confined to bed during the paroxysm, but may be allowed to leave the bed between the attacks if he feel strong enough and object to remaining in bed. In the remittent and pernicious forms absolute rest in bed is a necessity.

The *diet* as in other febrile diseases is to consist mainly of milk and liquid foods.

Of all drugs used in the treatment of this disease *quinine* holds the first place. This drug acts directly on the cause of the disease, the plasmodia, and destroys their vitality. The object of the treatment is to prevent future paroxysms and not to stop the paroxysm which is in progress, as this can not be done. There are two

methods of giving quinine, in one massive daily dose; and in small divided doses with a larger dose before the expected paroxysm. By the former method the toxic effects of the drug may be excited.

As quinine is slow in absorption, the last dose should be given several hours before the oncoming attack.

If a purge, as calomel, be given an hour before the administration of the quinine, this latter drug will act much more quickly and better.

In some susceptible individuals the toxic effects of quinine, known as *cinchonism*, come on quickly and even after a comparatively small dose. The signs of this condition are ringing in the ears, vertigo or dizziness, nausea, vomiting, fullness of the head, impaired vision, and at times deafness.

During the *cold stage* the patient may be made much more comfortable by covering him well with blankets, placing hot-water bottles to the extremities, and giving hot drinks. If the chill be very severe, inhalations of chloroform or amyl nitrite will be of service. Atropine by hypodermic is useful.

The *hot stage* is best treated by cool sponges or rubs. An ice-bag to the head is very grateful to the patient.

In the *sweating stage* the patient is made more comfortable by using such coverings as will easily absorb the moisture caused by perspiring.

The *remittent form* is managed on the same plan, more or less, as in typhoid fever. Absolute rest in bed, liquid diet, attention to the bowels and temperature. In case of tympanites, the turpentine stupes will be found useful.

Vomiting, which is very frequently present in this form, must receive especial attention. Small pieces of

ice by the mouth and a mustard paste to the epigastrium are of benefit.

The *pernicious form* as has been stated is very grave and needs vigorous treatment. The purpose of prime importance is the prevention of a second paroxysm. Quinine is given in enormous doses. Stimulants are to be freely administered.

In the *algid type* the external application of heat is of prime importance.

CHAPTER XXIV

ERYSIPELAS

Definition.—An acute, infectious fever characterized by an acute inflammation of the skin and general symptoms of toxemia.

Etiology.—The *exciting cause* of erysipelas is the streptococcus erysipelatis which is said to be identical with the streptococcus pyogenes.

The germ gains entrance through some break in the continuity of the cutaneous or mucous surfaces. In cases of facial erysipelas the bacterium usually finds a portal of entrance in the nasal passages.

Certain individuals seem particularly predisposed. Some women have recurrent attacks at the menstrual periods. Relapses and recurrences are liable.

Symptoms.—*Constitutional.* Rigors or chills generally usher in the attack. Several days of malaise, frontal headache, and gastric disorders may precede the general signs. In twenty-four hours the local lesion is generally manifest.

The temperature rapidly becomes high (104°F.), the pulse rapid, prostration is more or less prominent. The tongue is dry. The urine is scant in amount, dark in color, of a high specific gravity, and contains albumen. The bowels are usually constipated. Delirium is not uncommon.

Local.—A small inflamed area of a dusky red color is first seen. The local lesion is painful and tender and a

sensation of tension is frequent. The area of inflammation has a prominent well-defined margin. There is more or less swelling which pits on pressure. The lesion spreads from the periphery while healing in the center. Migration is rapid and a great portion of the body may become affected.

In facial erysipelas the eyelids and surrounding tissues may become greatly swollen, and the eyes closed. The whole face is sometimes swollen beyond recognition. Blebs or large blisters are of frequent occurrence on the face, eyelids, and forehead. In four or five days the redness begins to fade and the swelling to decrease, and unless recrudescence occur the process is at an end.

Complications.—Pneumonia, pleurisy, pericarditis, and endocarditis are not uncommon. Nephritis is a very serious complication, as also is septicemia.

Prognosis.—A simple case usually results in recovery in about two weeks. The prognosis is less favorable in those individuals suffering from other diseases, as nephritis, and in alcoholics and during the puerperal state.

Chronic swelling of the parts and eczema are common sequelæ.

Care and Management.—This disease is of a general character and not simply a local disease of the skin, as it was formerly thought to be.

Complete *isolation* of the patient is the first requisite. A very mild case of facial erysipelas may excite in a susceptible individual a most severe and fulminating form of the disease. Young children are especially likely to contract the disease, as are also women in the parturient stage. Dr. Goodell believed there is a relationship between puerperal sepsis and erysipelas.

The nurse or attendants should not come in contact with anyone suffering with an ulcer or an open wound of any kind, as these persons are very easily infected with erysipelas.

A nurse who has been attending a patient ill with erysipelas should under no circumstances undertake the care of a parturient woman until she (the nurse) is absolutely free from the danger of carrying infection. It will be safe to do pure medical nursing before entering surgical or obstetric service.

Rest in bed is necessary in the more severe cases, as the disease is very depressing. In the mild cases the patient may be up and around for part of the day.

The *diet* is of great importance and should be concentrated and very nourishing, as milk, gruels, eggs, etc. First because the disease is very depressing and prostrating, and secondly because recovery depends on the vitality of the patient, which can be kept in a good state only by providing the most nutritious foods.

The *bowels* should be kept open by saline laxatives and enemata.

Headache, which is often very trying, is relieved by the application of an ice-bag to the head.

Fever, if high, is lowered by means of sponges, packs, and baths.

Sleeplessness is overcome by a glass of hot milk, together with a hot foot bath and an ice-bag to the head.

The *kidneys*, which are liable to be affected in this disease, should be kept active by giving the patient plenty of drinking water.

The *heart* should be carefully watched.

Of *internal medicines* the tincture of chlorid of iron,

and some salt of quinine are most frequently given. These are simply mentioned in passing.

Antistreptococcic serum is much praised by eminent authorities.

We now come to *local measures*. These are manifold. Ichthyol probably holds the first place. Of all local applicants I have found it the most beneficial. It may be applied in one of several ways: as an ointment of twenty-five per cent. strength, or dissolved in water or glycerine (1 to 4).

A most excellent method is by combining it with collodion and painting it over the lesions. This method causes exclusion of air, which is *very* important, and also keeps the medicament in contact with the lesion.

One important point to be remembered in the use of ichthyol is that it should be freely applied.

Other applicants are resorcin which may be used alone or combined with ichthyol; solution of lead acetate; carbolic acid, 1 to 20; bichlorid of mercury, 1 to 1000; tincture of iodine; solution of boric acid; silver nitrate in a solution of 1 to 3.

If the lesion be on one of the extremities, adhesive straps applied around the limb above and below the site are said to prevent its extension.

If the case be one of facial erysipelas, attention should be given to the nasal and pharyngeal cavities and to the mouth. These should be cleansed by antiseptic solutions, as sprays, douches, and gargles. A 1 to 8 solution of hydrogen peroxid is very good.

All dressings should be burned as soon as removed. The nurse should scrub her hands thoroughly and immerse them in a 1 to 1000 solution of bichlorid of mercury after each dressing and before eating her meals.

The patient should have separate towels, washcloths, and eating utensils.

After convalescence cheap articles of clothing should be burned and other pieces may be disinfected with the room, as described under Scarlet Fever.

CHAPTER XXV

SEPTICEMIA, TOXEMIA, AND PYEMIA

Definitions.—These terms are being constantly confused and interchanged. Each is a distinct condition and it is important that they be thoroughly understood. I will endeavor to define each in simple and concise form.

Toxemia is a morbid condition characterized by the presence of *toxines* in the blood. An example is diphtheria. In this disease the local lesion as a rule is on one of the mucous membranes of the upper respiratory tract. The germs themselves rarely leave the local site, but the toxines or poisonous products which the bacteria form are absorbed and enter the blood; then they are carried throughout the body and give rise to general constitutional symptoms.

Septicemia is a morbid condition characterized by the presence of *bacteria* and their toxines in the blood. Typhoid fever is an example of a septicemic condition. Here we find the typhoid bacillus in the circulation.

Pyemia is a morbid condition characterized by the presence of pus-producing germs in the blood, together with the formation of secondary purulent deposits or metastatic abscesses.

Sapremia is a morbid condition characterized by the presence in the blood of the products of decay or putrefaction. For example, after a partial ectopic rupture a clot of blood will be found in the pelvis. This may soon be invaded by micro-organisms and decompose. The products when absorbed give rise to toxic symptoms.

All the conditions described above are referred to by the laity as *blood poisonings*, which in reality they are.

Etiology.—These conditions may be caused by any bacterium. *Toxemias* usually occur in the acute infectious diseases. *Pyemia* may follow any operation, being due to infection by pus-producing organisms, as the staphylococci and streptococci. *Sapremia* is frequent in incomplete abortion, in retention of the placenta in whole or in part, or of parts of the membranes; also in conditions accompanied by extensive sloughs.

Symptoms.—*Toxemia.* The general symptoms of toxemia are chill or chilly sensations, fever, headache, malaise, loss of appetite, restlessness, prostration, rapid pulse, and in pronounced cases delirium, coma, nausea, vomiting, and diarrhea.

Septicemia.—The symptoms are similar to those of toxemia but are much more severe. The chill may be pronounced, the fever is at first moderate but soon becomes high and runs a very irregular course with daily remissions or intermissions; the pulse becomes very rapid and feeble. Nausea and vomiting are not infrequent. Nervous symptoms are common: delirium, apathy, and convulsions (in the young). A very characteristic occurrence is the enlargement of the spleen and the lymph glands.

Pyemia.—This condition in most instances is ushered in by a pronounced chill. The chills recur frequently, in some cases daily and more or less often. With the chill there is a rapid and high rise of temperature. These paroxysms recur. The temperature may reach 103°F. to 105°F. and is followed by a more or less profuse sweat, after which the temperature is again low. These phenomena resemble very much those of malaria.

The *general symptoms* are general malaise, headache, loss of appetite, nausea, and vomiting. As the disease progresses prostration becomes very marked, anemia develops, the skin takes on a sallow hue, diarrhea may be exhausting, and the patient may develop a low typhoid condition with delirium, subsultus tendinum, etc.

Abscesses may form in any part of the body: in the joints, subcutaneous tissues, or in the viscera.

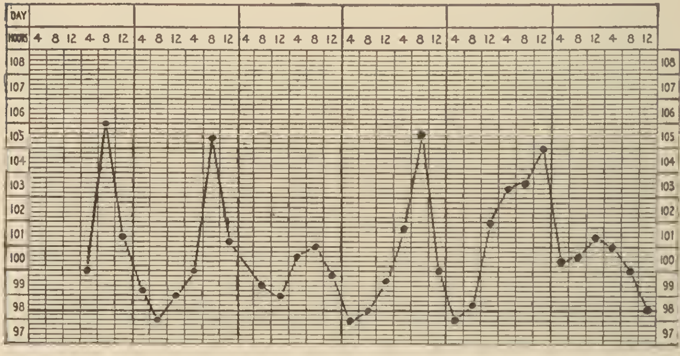


FIG. 20.—Temperature chart of pyemia.

Care and Management.—The outcome of these diseases depends largely on the nursing. Their course is so irregular and varied, their character is so general that the treatment consists principally of supportive and expectant measures.

Support of the strength of the patient is the most important requisite. These diseases run their course and recovery depends on the vitality of the patient.

The patient's vigor is conserved best by absolute *rest* in bed and a most nourishing *diet*. Milk will form the basis of the diet and is to be supplemented with

gruels, eggs in soft form, albumin water, broths, predigested forms of beef, etc.

Symptoms should be alleviated as they arise.

Fever, if it become excessive, is treated by the application of tepid or cool water in the form of sponges, packs or baths.

Delirium, which may occur, is also quieted by these same means.

Vomiting may be so severe that no food or medicine can be retained in the stomach. In these instances medicine must be given hypodermically if possible or by rectum. Nutritive enemata should be instituted. Oftentimes a mustard paste applied to the epigastrium will stop the vomiting. Washing out the stomach is of good service in selected cases.

Sweating, which is common, especially in pyemic cases may be lessened by bathing the body with alcohol, or a combination of alum one ounce, alcohol one-half ounce, and water two pints.

Stimulation is of frequent necessity. For general stimulation of the heart digitalis and strychnine by mouth are of greatest value. When rapid stimulation is necessary hypodermic injections of strychnine, ether, or spirits fermenti are indicated; or give by mouth dram doses of aromatic spirits of ammonia or compound spirits of ether. The use of camphor dissolved in sterile olive oil is an excellent stimulant. It should be given by hypodermic and in one-grain doses.

Elimination of the toxines is of vital importance and should be encouraged by one or all of the following methods.

By the Bowels.—The bowels should be kept open by means of calomel, or better, by saline cathartics, as

magnesium sulphate (Epsom salts), or sodium and potassium tartrate.

In some cases of pyemia a colliquative diarrhea occurs. This should not be checked at once as it is one of nature's ways of expelling toxines. A large quantity of the toxines are excreted into the bowels; therefore, by emptying the intestines we get rid of a large amount of toxines.

Washing out the colon is of excellent service. I have found a most admirable method in the use of the Kemp double rectal irrigating tube, which allows a circulation of water to take place in the rectum and colon. The inflow tube is connected with the source of water, as a fountain bag or an irrigating jar; the outflow tube is connected with a large tube by means of rubber tubing. Normal saline solution is used in large quantities. In one case I used as much as fifty gallons of the solution.

The temperature of the solution used in colonic irrigation should be of such a degree that when it reaches the colon it is not above 99°F. If a long tube be used on the fountain bag, the temperature of the solution may be 104°F. If a short tube be used, then 100°F. or 101°F. is enough. If the temperature of solutions, when large quantities are used, be too high, there is a liability of producing heat stroke, or of causing excessive fever in the patient.

By the Skin.—Sweating is promoted by hot drinks, by wrapping the patient in hot dry or wet blankets, or by introducing heat under the bedclothing by means of a hot-air apparatus. Hypodermoclysis of normal saline solution is very useful.

By the Kidneys.—Give the patient plenty of water

to drink. Encourage the flow of urine with the spirits of sweet niter. Hypodermoclysis of normal saline solution is of especial value in eliminating the toxines by the urine. They should be given as regularly as any medicine. One case of severe sepsis under my care was saved by the systematic giving of normal salt solution under the skin.

Use of Antitoxin.—Marmorek in 1895 announced the discovery of an antistreptococcic serum and also reported its successful use in many septic cases. Whether it be of any real value in general infections is yet to be ascertained. It is given in the same way as the diphtheria antitoxin, in doses of ten cubic centimeters.

The use of organic silver salts I think will, in the future, partially solve the treatment of general infectious processes.

PART III

ADDENDA

CHAPTER XXVI

ANTITOXINS AND BACTERIAL VACCINES

Antitoxins

One of the greatest if not *the* greatest advance in medical science was the production of substances which counteract the destructiveness of bacterial poisons.

Closely connected with the subject of antitoxins is that of *immunity*.

Immunity may be complete or partial, natural or acquired, temporary or permanent.

Natural immunity for the various infectious diseases is enjoyed by not a small number of persons.

Acquired immunity is obtained in various ways: By the injection of antitoxins; by modified virus and vaccines, as in smallpox; by the gradual injections of toxines; by the gradual injection of virulent cultures; by a previous attack of the disease.

All the above means bring about the same ultimate result, a stimulation of the body cells to form certain antagonistic bodies or antitoxins.

When bacteria gain entrance to the human body, they begin to multiply in number and form certain poisonous substances known as *toxines*, and these circu-

late in the blood and cause general "blood poisoning" or *toxemia.* It is this generalization that causes the seriousness of the disease. The germs themselves, as a rule, remain in a local place. In typhoid fever the germs find their resting place in the coats of the bowels; in pneumonia, in the lungs; in diphtheria, on the mucous membranes of the larynx, pharynx, or nose. If the germs also enter the circulation and are scattered far and wide, the condition is known as *septicemia.* If the germs after being scattered about the body form abscesses, the condition is called *pyemia* and the abscesses are designated *metastatic abscesses.* While mentioning the different forms of "blood poisoning" I will call attention to a fourth form, known as *sapremia.* This is caused by a circulation in the blood of putrefactive material. A good example is found after labor and results from a retention of all or part of the placenta. The part that remains in the uterus will soon decompose and this material, when absorbed, will cause a certain septic condition known as *sapremia.*

The *toxines* mentioned above, when circulating in the blood, act upon the cells of the body and cause the appearance of symptoms characteristic of the disease. The body cells on the other hand, as soon as harassed by these toxines are stimulated to resistance, which is effected by the formation of bodies which antagonize the toxines, and are known as *antitoxins.*

If the toxines be weak or small in quantity, the body cells may overcome their deleterious action, and the individual survives. If the toxines be very virulent and the resistance of the person be low, then the bacteria are the victors and the individual perishes.

If the toxines be virulent and the resistance of the person be great, the battle is more evenly balanced and the victory may be won by either side. First the laurels sway to one side and then to the other. It is in this type where the reinforcement sent by the physician will aid the patient in conquering.

As said above when toxines enter the body the cells of the body at once begin to produce defensive agents in the form of antitoxins. Before discussing the production of antitoxins a few definitions are necessary.

A *toxine unit* is ten times the amount of toxine required to kill in twenty-four hours, a guinea-pig weighing 250 grams.

An *antitoxin unit* is ten times the amount of antitoxin required to neutralize one toxine unit.

Production of Antitoxin.—In discussing the production of antitoxins I will follow the procedure used in producing diphtheria antitoxin.

A culture is made by planting live diphtheria bacilli in sterile bouillon and this is placed in a warm room to grow from four to seven days. The result is what is called a *virulent culture*. This culture is then attenuated by adding to it carbolic acid until it becomes five-tenth per cent. solution. It is then filtered through stone ware, which removes the germs and foreign matter and a clear solution results containing the toxines. This toxine solution is tested as to its strength by the inoculation of guinea-pigs. The strength having been determined, it is ready for use.

For the production of antitoxin the horse is used because of the large amount of blood it contains, because of its more or less immunity, and because of its easy management.

Into the muscles of the horse's neck is injected ten to twenty toxine units of toxine. In twenty-four to forty-eight hours the area will become red, swollen, and hot. The temperature becomes high and signs of depression ensue. After two or three days these symptoms disappear when another and larger dose of toxine is injected, and so on until enormous doses of this toxine are given. At the end of one to three months the serum of the horse's blood will be rich in antitoxin.

Test bleedings are made from time to time to determine the amount of antitoxin present and when sufficient is present the final bleedings are made every few days until twenty or more liters of blood are removed from the horse. About one-half of the bleeding will be serum which is collected in sterile vessels and is prepared to be sold as antitoxin.

The horse, after a short rest, is again injected with toxines.

If when the toxines are injected, there be antitoxin injected at the same time, the dose of toxine may be greater and the horse is immunized very rapidly, each successive injection containing less antitoxin and more toxine.

Varieties of Antitoxins.—Of all antitoxins, greatest success has followed the use of *diphtheria antitoxin*. The antitoxin should be administered as early as possible and in large, frequently repeated doses. Antitoxin itself is not poisonous but the serum may cause disturbing symptoms.

The average curative dose is 3000 units, and for immunizing purposes at least 500 units should be given. The immunity is temporary, lasting from four to six weeks (H. Biggs).

Other antitoxins which have been produced with greater or less success are those against the streptococcus, tetanus bacillus, typhoid bacillus, bacillus of bubonic plague, yellow fever, pneumonia, cholera, etc.

Bacterial Vaccines

Dr. Wright, of London, has been foremost in the introduction into medicine of the use of bacterial vaccines. These vaccines consist of killed cultures of bacteria and, when injected into man, aid the body to overcome the action of the specific infection by stimulating the cells to increased protective energy. The immunity conferred by the use of vaccines differs from that of antitoxins in that the latter is passive, whereas the former is active.

Bacterial vaccines are killed disease germs held in suspension in a sterile physiological salt solution to which has been added a small amount of some antiseptic for the purpose of preservation. These vaccines are standardized so that a given quantity contains a known number of killed germs.

The action of bacterial vaccines when injected into the body is that of establishing an active immunity toward that particular germ, much as is naturally done in our bodies. The introduction of these dead germs stimulates the body cells and fluids to create or form certain antibodies, which aid in the destruction of the live disease germs which menace the person. Opsonins are also formed. The leucocytes or white blood corpuscles will and do absorb and destroy disease germs. When the germs are first acted upon by the opsonins they are more readily devoured and obliterated by the leucocytes.

The bacterial vaccines are administered under the skin in the same way and with the same aseptic precautions as a regular drug hypodermic injection.

These vaccines have a twofold use: first, as curative agents in combating certain diseased conditions and secondly, as preventive agents. The most notable example of the latter class is the typhoid vaccine. The prevention of typhoid fever by the use of a bacterial vaccine has been one of the most illustrious advances of biological medicine in late years. The results are remarkably exact, as attested by its use in the great armies of the world.

Major F. F. Russell of the U. S. Army, in a report on antityphoid vaccination, states: "One can best judge of the combined effects of vaccination and sanitation by comparing the camp located at San Antonio, Texas, with the one located at Jacksonville, Florida, in 1898. At Jacksonville there were assembled 10,759 men, among whom there were 1729 undoubted cases of typhoid, and including those in which a diagnosis of typhoid was probable there were 2673 cases, with 248 deaths. This camp lasted approximately as long as the camp at San Antonio in 1911; both camps were situated in about the same latitude and each had artesian well water of excellent quality, yet in 1898 there were over 2500 cases of typhoid fever, with 248 deaths, and in 1911 only 2 cases, with no fatalities. We know that the immunity was not due to lack of exposure, since there were reported to the health office 49 cases of typhoid fever, with 19 deaths, among the civil population of the city of San Antonio during the period of encampment."

Every person who in any way is liable to come in contact with typhoid infection should be immunized by

the use of typhoid vaccine. Nurses, physicians, students in colleges and boarding schools, traveling salesmen, tourists, and summer vacationists will derive great protection from its employment.

Another vaccine to attract as much or more attention than has the typhoid vaccine is that used in protection against diphtheria. This is called the **diphtheria toxin-antitoxin mixture**. This consists not only of a pure vaccine or toxin mixture but also has added to it a certain proportion of antitoxin. This probably lessens the toxicity or poisonousness of the mixture. The immunity brought about by the use of diphtheria antitoxin is of a passive nature and is fleeting in duration, probably lasting only a very few weeks, whereas that produced by the toxin-antitoxin mixture is active and lasting, enduring, so far as we know, for years or even a lifetime. It is administered much as is the typhoid vaccine, in three successive doses with weekly intervals. The production of full immunity is not brought about until the lapse of several months. This T. A. mixture is not employed in the treatment of diphtheria, but used to produce immunity in the well. It is particularly useful in immunizing school children and inmates of institutions.

A vaccine has been elaborated to be used for immunizing against and for treating **whooping-cough**. It is probably more useful in the former rôle. It must be used in large dosage. · A probable factor in failure to achieve success in the past with this vaccine was the employment of too small doses.

The **influenza** vaccine has been used in the prevention of this disease with indifferent success. It is probably good advice to encourage its continued employment.

Among other bacterial vaccines of known value are the acne-staphylococcus vaccine for the treatment of acne; Neisser bacillus vaccine against gonorrheal infections as arthritis, cystitis, salpingitis, conjunctivitis, urethritis, etc.; staphylococcus vaccine for pus formations as furuncles, carbuncles, pleurisy, periostitis and ulcers; Streptococcus vaccine for scarlet fever, erysipelas, septicemia and mixed infections.

The vaccine is administered by means of a hypodermic syringe; the initial dose varies from 5,000,000 to 1,000,000,000 bacteria. After injection there occur certain phases or reactions, known as the negative and positive phases. The negative phase is a condition in which the opsonins of the blood are decreased, and is clinically noted by the depressed state of the patient. The positive phase is marked by an increase of the opsonins in the blood, with general improvement of the patient's condition.

CHAPTER XXVII

BACTERIA

In this chapter only such micro-organisms as are concerned in the diseases discussed in this book will be considered.

A *bacterium* is a micro-organism of vegetable origin. Bacteria cause changes in the substance in which they grow and form new products in themselves which they retain or throw out.

Classification.—Bacteria are classified in several ways: *Parasites* and *saprophytes;* the former are called such because they subsist on living organic tissue; the latter live on dead material.

Pathogenic and *non-pathogenic;* the former are the cause of disease and the latter do not cause disease.

Aerobic, those which require oxygen to maintain life. *Non-aerobic*, those which live without oxygen. *Facultative*, those which can grow with or without oxygen.

Micrococci are bacteria consisting of spheric bodies which may vary in their arrangement. If the spheric bodies are in the form of a chain, then that micrococcus is known as a *streptococcus;* if in the form of a bunch of grapes, that is, grouped, it is a *staphylococcus;* if in pairs, then *diplococcus;* if in series of fours, then *tetrads;* if in cubic form, then *sarcinæ.*

Bacilli are bacteria which appear as small rod-shaped bodies.

Spirilla are bacteria which are curved.

Growth.—Bacteria multiply by *direct division*, in which the bacterium is divided into two segments and each of these grow as separate individuals. Or they multiply by what is known as *spore* formation, in which small glistening bodies appear within the bacterium, which are later set free and become independent bacteria.

Nutrition.—A medium for bacterial growth must contain nitrogen, which is supplied by albumen; carbon, which is supplied by sugar; and the presence of moisture. The medium also should be neutral or slightly alkaline in reaction, and be kept at a temperature of about 98°F. Bacteria will adapt themselves to the soil and temperature to which they are subjected.

Media for the growth of bacteria are numerous; among the more common are the following:

Bouillon, which is made by compressing cold beef and adding common salt and peptone to the juice. This juice is then boiled and filtered.

Gelatine is made by adding ten per cent. of gelatine to the bouillon.

Agar-agar, made by adding one per cent. of agar-agar to bouillon. Agar-agar, also known as Japanese gelatine, is a vegetable gelatine derived from a variety of seaweed growing along the coast of Japan.

Other forms of media are blood serum, glucose, potato, milk, blood and peptone solution.

Micrococci.—*Staphylococcus Pyogenes Aureus.* This is the most common bacterium of a pathogenic nature found in the body. It is the cause of the majority of the circumscribed purulent inflammations. It

FIG. 21.— Various Forms of Micro-organisms. 1, Streptococci; 2, Staphylococci; 3, Diplococci; 4, Tetracocci; 5, Spirilla; 6, Bacilli; 7, Bacilli with spores.

derives its name from the fact that it is composed of spheric bodies arranged in groups (staphylococcus), that its presence in the body is accompanied by the production of pus (pyogenes), and that if cultivated on media it produces colonies with an orange color (aureus).

Other pathogenic staphylococci are the *staphylococcus pyogenes albus* and *staphylococcus pyogenes citreus.*

Streptococcus Pyogenes.—This is also a common micro-organism and is the cause of most of the diffuse purulent inflammations. This bacterium is the cause of *erysipelas.* The secondary or mixed infections in pneumonia, tuberculosis, typhoid fever and diphtheria are due to the streptococcus pyogenes in a majority of cases.

Pneumococcus.—This germ is the cause of lobar pneumonia. The pneumococcus is lance shaped and surrounded by a capsule. The coccus is very sensitive to light, heat, and to germicidal solutions.

The pneumococcus is not only the cause of lobar pneumonia, but may also be the exciting agent of meningitis, peritonitis, pleurisy, pericarditis, endocarditis, and otitis media.

Diplococcus Intracellularis Meningitidis.—This bacterium is the cause of cerebrospinal meningitis. The germ is composed of two spheric bodies and is usually found situated in the pus cells; hence its name.

Bacilli.—*Typhoid bacillus* was first described by Koch and Eberth. The bacilli occur as small, slender, rod-shaped bodies. They do not stain readily and inoculations of the culture into animals are unsatisfactory as to results.

THE WIDAL REACTION.—If a drop of a typhoid bouillon culture be placed as a hanging drop on a glass slide and be examined under the microscope with an oil-immersion lens, the typhoid bacilli will be seen as small, rod-like bodies moving and wriggling about. If to this drop of culture be added some diluted serum

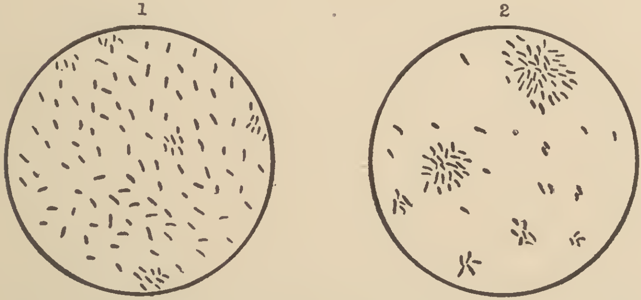


FIG. 22.—Diagram showing the application of the Widal test. 1, Before; 2, After addition of the patient's serum.

obtained from a person supposed to be suffering from typhoid fever, the bacilli in a short time will become quiet and gather in groups if the person have typhoid fever. If the person be not afflicted with this disease, the movements of the typhoid bacilli are not altered by adding the serum to the culture drop.

The typhoid bacilli are eliminated from the body of the individual especially by the bowel movements and the urine.

Influenza bacillus or the bacillus of Pfeiffer is the exciting cause of influenza. The germ is very small and can be grown only in the presence of hemoglobin. It may persist in the nasal and pharyngeal cavities

for months after the patient has recovered from the disease.

Outside of the human body this germ has but little vitality; it dies in a few hours and cannot live in dried sputum.

Diphtheria bacillus is also called the Klebs-Löffler bacillus from the men who first described it. The bacillus is irregular in its outline, occurring as straight or curved rod-like bodies with clubbed ends. They are found in diphtheria on the surface of the affected mucous membrane. They here form certain toxines which are absorbed and cause the general symptoms of a toxemia. Locally the bacilli cause a death and liquefaction necrosis of the superficial layers of the mucous membrane, forming a false or pseudomembrane.

To combat the toxines of this bacillus a substance known as *antitoxin* has been found. (See Chapter XXVI.)

Tubercle Bacillus.—This bacillus occurs as small slender rods slightly bent or curved. They do not produce spores and grow with difficulty on media. They are very resistant to outside influences and will live for a great length of time in dried sputum.

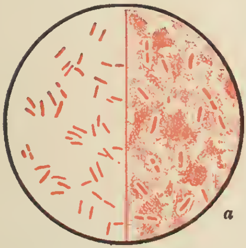
Tuberculin.—This substance when injected into a person will produce a certain reaction and is of diagnostic value. The *reaction* is local and general. The local reaction consists of redness, swelling, and tenderness; the general reaction consists of a rise of temperature, general malaise, pain in the back, head and legs, nausea and vomiting, and at times a diffuse eruption.

Tuberculin is prepared by taking a five-week glycerine-broth culture of tubercle bacilli and evaporating it to one-tenth of its original volume, and filtering.

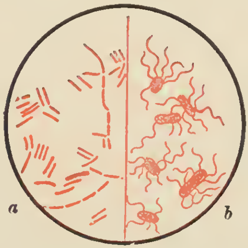
PLATE I.

Streptococcus pyogenes (×700).

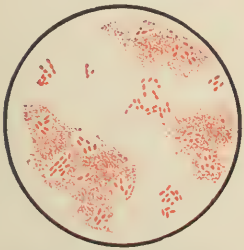
Micrococcus pyogenes aureus (× 1000).



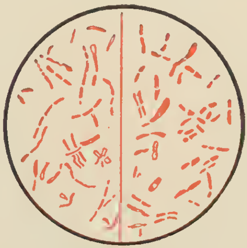
Bacillus pneumoniæ, (× 800); *a*, as seen in sputum.



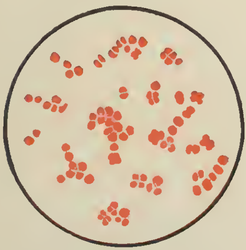
Bacillus typhosus, *a*, ordinary form (× 1000); *b*, flagellate form (× 1500).



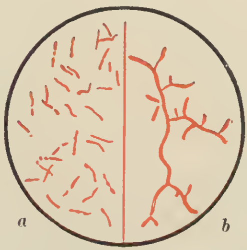
Bacillus influenzæ in nasal secretion, (× 1000).



Bacillus diphtheriæ, (× 1000).



Micrococcus meningitidis cerebrospinalis, (× 1000).



Bacillus tuberculosis; *a*, (×1000); *b*, ramified or branching form.

The test is made by injecting into the person one-half milligram of tuberculin. In twelve hours the reactions discussed above will appear. If no reaction occurs, the test should be repeated in a few days, using more of the tuberculin. The usual place to give the injection is in the skin between the scapulæ.

CHAPTER XXVIII

URINE AND ITS EXAMINATION

Urinalysis is one of the most positive methods for determining the presence of many important abnormalities of the human organism. It is too frequently ignored by the medical man, or it is rapidly and improperly conducted, therefore valueless and misleading. It is important that every nurse should be thoroughly acquainted with physiological and pathological forms of urine, regarding its properties and constituents.

Collection of Urine.—The urine to be preferred for examination is a four-ounce specimen of a twenty-four-hour collection. A statement of the amount of urine passed by the patient in the given twenty-four hours should accompany the specimen. If it is impossible to obtain a twenty-four-hour specimen, then the first urine voided in the morning is the next to be preferred.

Urine for examination should be collected in an absolutely clean vessel and protected with a covering.

We will now consider the properties of urine.

Properties

Quantity.—*Normal.* The amount of urine voided in twenty-four hours varies considerably according to the season, the amount of liquid taken, the profuseness of sweat, etc. From forty to sixty ounces are normal.

It is *increased* in cold weather; when the amount of water ingested is large; in constipation, and by use of

diuretics. It is *decreased* in warm weather; when the amount of water taken is small; and when sweating is profuse.

Increased (polyuria) in diabetes mellitus; diabetes insipidus; chronic interstitial nephritis; hysteria; cardiac hypertrophy; after epileptic attacks, and during convalescence from typhoid fever and pneumonia, and nervous excitement.

Decreased (oliguria) in fevers; acute nephritis (three to six ounces); chronic parenchymatous nephritis; cardiac failure; diarrheal diseases; anemia; emphysema; shock and collapse; the administration of drugs, as turpentine, cantharides, digitalis and ether (inhalation).

Color.—*Normal.* Urine is, physiologically, of a light amber color and clear, but its color varies with the amount of urine voided.

Abnormal.—*Pink* cloudiness is due to an excess of amorphous urates.

White or yellow haziness may be produced by an excess of phosphate or the presence of mucus or pus.

Dark amber, in diseases with decreased urine, as fevers, acute nephritis.

Milky urine is due to the presence of chyle, and the condition is termed *chyluria*.

Red-brown, or what may be appropriately called *beef-brine*, urine is due to the presence of blood, and is known as *hematuria*. It occurs in acute nephritis, renal injury, renal calculosis, cystitis, stone in bladder, etc., and during the administration of turpentine, cantharides and urotropin, in toxic doses.

Golden-brown urine results from the presence of bile coloring matter and occurs in obstructive jaundice, and the condition is called *biliuria* or *choluria*.

Black or *greenish-brown* coloration follows poisoning from phenol derivatives, as carbolic acid, creosote, lysol and tar.

Yellow urine is frequent after the administration of senna, santonin, picric acid.

Blue or *green* urine follows the medicinal use of methylene blue. The patient should always be informed of this change of color.

Red urine is due to the presence of hemoglobin, and the condition is termed hemoglobinuria. Hemoglobin occurs in the urine in scurvy, pernicious anemia, malaria, and after poisoning by trional, potassium chlorate and toxic mushrooms. The urine is bright red after the administration of logwood and fuchsin.

Pale urine occurs in diseases characterized by polyuria, as hysteria, diabetes, chronic interstitial nephritis, and at the crisis of febrile disorders.

Odor.—*Normal.* Not much can be said of the odor of urine, except that it is characteristic and urinous.

Abnormal.—Certain drugs and foods alter the odor of the urine, as asparagus, copaiba, valerian, musk and asafœtida.

Sweetish odor of the urine occurs in diabetes mellitus.

Violet-like odor follows the administration of turpentine.

Ammoniac odor may be present when the urine is voided, or may develop soon after being passed. It occurs in certain types of cystitis.

Fecal odor to the urine may be due to the presence of material which has escaped from the bowel into the bladder through a fistula. A similar odor is due to decomposing pus in the bladder.

Reaction.—*Normal* urine has a slightly acid or neutral reaction.

Abnormal.

Hyperacid.—Urine is excessively acid in leucemia, rheumatism, lithiasis and chronic nephritis.

Alkaline urine occurs in some forms of cystitis, in nervous dyspepsia, cachectic conditions, and after administering certain drugs, as citrates, tartrates and bicarbonates.

Specific Gravity, or Density.—By the specific gravity of urine we mean the weight of a certain amount of urine as compared to the weight of a like quantity of distilled water at a certain temperature. This can very easily be computed by the use of a simple instrument known as an urinometer.

Normal.—The density of urine voided by a healthy individual varies between 1015 and 1025.

Higher.—The gravity is higher when the amount of urine voided is decreased (see Quantity.)

Lower.—The gravity is lower when a large amount of urine is passed.

Abnormal.

High in diabetes mellitus (1070), acute nephritis, chronic parenchymatous nephritis, febrile conditions, diarrheal disorders and shock.

Low in diabetes insipidus, chronic interstitial nephritis, hysteria (1000).

Constituents

Normal.—Urine is a watery fluid holding in solution certain salts, foremost of which are urea, uric acid and urates, phosphates, chlorids, sulphates and oxalates.

Urea is one of the most important constituents of

normal urine. It is freely soluble in water, hence never appears as a sediment. Urea is generally present in urine to the amount of two per cent. The daily output of urea can be easily computed by multiplying the quantity of urine voided in twenty-four hours by the percentage of urea, and averages 500 grains. Urea is increased after meals rich in nitrogenous food and after drinking large quantities of water; it is decreased when the amount of food taken is small, when the bowels are loose, and when sweating is profuse.

The excretion of urea is increased in fevers, diabetes, malaria, anemia, and after the crisis of pneumonia. It is diminished in all forms of nephritis, uremia, eclampsia, cachexia, rheumatism and nervous disorders.

The estimation of urea will seldom be required of the nurse. For description of the method, consult some work on physiological chemistry.

Uric acid and urates are present in the urine in small quantities. They are *increased* in fevers, tuberculosis, gout, rheumatism, leucemia, diabetes and rickets. After the excessive use of milk and certain drugs, as mercury, salicylates and colchicum, the amount of uric acid excreted is increased.

They are *diminished* in anemia, nephritis, and after the use of iodids, lithium salts, sodium carbonate and chlorid.

Chlorids.—The chlorids in the urine are *increased* in malaria, diabetes and nephritis; are *decreased* in pneumonia, rheumatism and some fevers.

The excretion of *phosphates* is increased in nervous disorders.

Abnormal.—The more important pathological constituents of urine are albumin, sugar, bile, blood, pus, mucus and acetone.

Albumin may be said to never occur in the urine normally, and is usually indicative of some pathological change. The condition is known as *albuminuria*, and is met with in all forms of nephritis, especially the acute and chronic parenchymatous types; in febrile conditions, especially erysipelas, scarlet fever and diphtheria; in anemia, Grave's disease and leucemia; in cardiac disease, emphysema, cirrhosis of the liver; and after the toxic use of certain drugs, as lead, mercury, turpentine, cantharides and ether.

The tests for the presence of albumin in urine are manifold. We will consider only three, which are simple and at the same time accurate: Nitric acid test, heat and nitric acid test, potassium ferrocyanide and acetic acid.

Before testing urine for albumin there are two necessary requisites: the urine should be clear and of an acid reaction. If the urine is not clear, it must be filtered; if not acid, add dilute acetic acid until the specimen is slightly acid.

Heat and Nitric Acid Test.—Fill a test tube three-quarters full with the urine to be examined; take hold of the bottom of the tube and hold diagonally in the flame of an alcohol lamp, or bunsen gas burner, so that the uppermost part of the urine is heated; allow it to boil for a moment. If no cloudiness or coagulum appear in the urine when heated, then albumin is not present. If a cloudiness does appear, it may or may not be indicative of albumin. This is positively established by adding to the heated urine a few drops of strong nitric acid, when the white cloud will disappear if not due to albumin (but phosphates); but if due to albumin, the cloudiness does not disappear but may increase.

Cold Nitric Acid Test.—Place in a test tube pure nitric

acid (about two drams), and then with a fine glass tube allow some of the suspected urine to gently flow upon the surface of the acid. If albumin be present, a ring of white coagulum will form at the point of contact of the fluids.

Potassium Ferrocyanide.—This test is very simple, rapid and accurate. It requires no heat, and caustic acids are not employed. For these reasons I advise its application.

To a test tube half full of clear urine, add two drams of a five per cent. solution of potassium ferrocyanide and mix intimately; then a few drops of acetic acid. If albumin is present, a white-yellow haziness or cloud will appear.

Sugar.—Sugar which occurs pathologically in the urine is not of the cane-sugar type, but is of the same class as grape sugar. This condition is known as *glucosuria* and *glycosuria*. Sugar occurs in the urine in diabetes mellitus, obesity, diseases of the brain, especially when affecting the medulla; in certain affections of the liver and pancreas; during the administration of certain drugs, as chloral, alcohol, arsenic and chloroform (inhalation), and after the excessive use of sugar as a food.

The tests for sugar in the urine are numerous. Those which we will consider are Fehling's, Haines' and fermentation tests.

Fehling's Test.—To apply this test a special solution is necessary, which is best preserved by having it prepared in two solutions. Solution 1, or the copper solution, consists of copper sulphate or blue vitriol (34 parts) and water (1000 parts); and Solution 2, or the alkaline solution, consists of sodium-potassium tartrate

or Rochelle salts (173 parts), sodium hydrate or caustic soda (60 parts), and water (1000 parts).

To prepare Fehling's solution, mix equal parts of Solutions 1 and 2.

The test is applied by filling a test tube half full with the prepared solution and heating (boiling) the uppermost part; then add a few drops of the suspected urine to the hot solution, when a red-brown coloration and precipitate will occur if the sugar be present.

Haines' Test.—This test is applied in the same manner as Fehling's, the difference being in the solution used. The Haines' solution is similar to the Fehling's solution, excepting that glycerine is used in place of Rochelle salts, and is more stable.

Fermentation.—This test is accurate, but more complicated than the above, and depends on the fermentation of the sugar by yeast.

Bile is present in the urine when the natural flow of bile is obstructed. The urine is of a golden-brown color.

Gmelin's Test.—Into a test tube two drams of nitric acid is placed, and about the same quantity of the urine is allowed to gently flow on the surface of the acid. If bile is present, a series of colored rings, green, blue, brown or yellow, will form at the junction of the two liquids.

Pus is found in the urine in purulent inflammation of the kidneys, bladder or urethra.

Its presence is detected by the addition of caustic potash (potassium hydrate) and boiling the mixture, when a tenacious, ropy mass results. This is Donne's test.

CHAPTER XXIX

SIGNS OF THE ONSET OF THE TOXIC EFFECTS OF DRUGS

It is important that the nurse should be familiar with the action of certain drugs, so that in the absence of the physician if the full physiologic action of the drug be taking effect, further harm may be avoided.

This list includes the more common and important drugs:

Drug.	Sign.
Acetanilid.	Cyanosis, sweating, feeble pulse and cold skin.
Aconite.	Tingling sensation of the skin, vomiting, weak pulse.
Arsenic.	Puffiness of the lower eyelids, indigestion, diarrhea, headache.
Bromids.	Acneal eruption on the face and back, malaise, and indigestion.
Belladonna.	Dryness of the nose, mouth and throat; dilatation of the pupils; skin becomes red and dry; dizziness; giddiness.
Carbolic acid.	Headache, vomiting, diarrhea, darkly colored urine.
Colchicum.	Nausea, vomiting, purging, and weak pulse.

Digitalis.	Slow pulse, which becomes rapid and irregular if the patient sit up; paleness of the face; vomiting of mucus and bile.
Ergot.	Numbness, tingling sensation, feeling of cold, vomiting, purging, paleness of the surface.
Iodids.	Running of the eyes and nose, injection of the conjunctivæ, acneal eruption, diarrhea, and salivation.
Mercury.	Salivation, diarrhea, metallic taste in the mouth, sore gums, fetor of the breath, colicky pains, and paralyses.
Nitroglycerine.	Flushing of the face, throbbing headache, fullness of the head.
Opium.	Constipation, sweating, dryness of the mouth, contracted pupils.
Quinine.	Fullness of the head, buzzing and ringing in the ears, deafness, dizziness, and headache.
Salicylates.	See quinine.
Strychnine.	Twitchings of the body, restlessness, tingling sensation, and convulsions later.
Turpentine.	Violet-like odor to the urine, red eruption, painful urination, and bloody urine.

CHAPTER XXX

POISONS AND THEIR ANTIDOTES

Poisoning may be classified as acute and chronic. The acute form may result from an overdose of a drug taken by mistake or for suicidal purpose. The chronic form results from the continuous administration of a drug, or from being constantly in contact with certain poisons, as a painter or type-worker becomes lead poisoned or workers in match factories suffer from phosphorus poisoning.

Treatment of Acute Poisoning.—The indications are: To remove the poison from the body as soon as possible; to render inert the poison which cannot be removed; to counteract the toxic action of the poison, and to support the patient with stimulants, if necessary.

Removal of the Poison.—This is brought about by emesis and catharsis. If there is reason to believe that some of the poison still remains in the stomach, emetics should be resorted to. Among the common and most used emetics are *salt water*, made by dissolving a teaspoonful of salt in a cup of lukewarm water; *ipecac* (30 grains of the powder or 30 m. of the fluid extract); *apomorphine*, given hypodermically in doses of one-fifteenth to one-tenth of a grain.

Cathartics may be used to remove the toxic material that has gained entrance to the intestines.

To Render the Poison Inert.—This is made possible by the use of antidotes which act either mechanically

or chemically. The *mechanical antidotes* decrease the toxic effects of poisons by preventing or lessening their absorption, and are principally fixed oils, as cotton-seed, olive or linseed oils; also milk, starch paste and gummy or mucilaginous drinks, as flaxseed and slippery elm teas. The *chemical antidotes* render the poisons inert by neutralizing them or changing them into less toxic or non-poisonous substances. The chemical *antidotes to acids* are limewater, chalk, magnesia, bicarbonates, milk, white of egg, etc. The chemical *antidotes of alkalies* are diluted acids, lemon juice, vinegar, acid lemonade, white of egg, milk, etc. The chemical *antidotes to alkaloids* are tannic acid, potassium permanganate, strong tea.

To Counteract Poisons.—This is brought about by giving drugs whose actions are diametrically opposed to the actions of the poison taken. Here are given a list of drugs, with their antagonists:

Aconite, aconitine (digitalis, atropine).

Atropine, belladonna (morphine, eserine, pilocarpine, aconitine).

Belladonna. See atropine.

Chloral (strychnine, amyl nitrate).

Cocaine (strychnine, alcohol, nitroglycerine).

Digitalis (nitroglycerine, aconite, senega).

Hyoscine (pilocarpine, morphine).

Hyoscyamus. See atropine.

Morphine (atropine, strychnine, caffeine).

Nitroglycerine (ergot, atropine, suprarenal extract).

Nux vomica. See strychnine.

Opium. See morphine.

Physostigmin, or eserine (atropine, strychnine).

Pilocarpine (atropine, alcohol).

Strychnine (chloral, bromids, morphine, eserine).

Veratrum viride (atropine, digitalis).

Stimulation is necessary in all cases of severe poisoning. The most used are: ammonia (aromatic spirits), ether, alcohol (brandy, whiskey), digitalis, strychnine, atropine and amyl nitrite.

Special Antidotes

Poison	Antidote
Acetanilid, antipyrine, phenacetin, migraine tablets, and headache cures.	Plenty of air, hot applications, and stimulation.
Acid, carbolic, salol, creosote, etc.	Whiskey by mouth, soluble sulphates, as Epsom or Glauber salts, white of egg, milk, and stimulants.
Acid, hydrocyanic.	Oxygen and stimulants.
Amyl nitrite, nitroglycerine and the nitrites.	Fresh air, tincture of digitalis and other stimulants.
Arsenic, Fowler's, Pierson's and Donovan's solutions, Paris green, etc.	Dialyzed iron, iron hydrate (mix dilute ammonia water with a solution of iron sulphate).
Belladonna, atropine, and hyoscyamus.	Morphine and stimulants.
Bromids.	Stimulants.
Castor oil beans.	Opium for the colic and stimulants.
Chloral.	Strong coffee and strychnine.
Cocaine.	Stimulants and oxygen.

Digitalis, squill, strophanthus, and convallaria.	Saline cathartics and stimulants.
Lead compounds.	Sulphuric acid, lemonade, milk, white of egg, saline cathartics, hot fomentations, opium for the cramps, and the iodids.
Mercury.	See lead.
Opium, morphine, and codeine.	Potassium permanganate by mouth and hypodermically, tannic acid, coffee, atropine, flagellation.
Phosphorus, matches, rat poison.	Oil of turpentine, Epsom salts, and stimulants.
Poison-ivy.	Apply fluid extract of grindelia, saleratus, or lead acetate solution.
Strychnine.	Chloral, bromids, and stimulants.
Sulfonal, trional, etc.	Sodium bicarbonate, strong coffee, and stimulants.
Veratrum.	Stimulants.

CHAPTER XXXI

ENEMATA AND TOPICAL APPLICATIONS

ENEMATA

The uses of enemata are: To clean out the lower bowel; to supply nourishment; to introduce water into the system; for medication, both general and local.

To Clean Out the Lower Bowel.—*Soapsuds.* Agitate one ounce of soft soap with one and one-half pints of warm water.

Glycerine. Equal parts of glycerine and water, about one ounce of each.

Purgative. To one pint of soapsuds (see above) add one ounce of Epsom salts, one dram to one-half ounce of turpentine, and one ounce of glycerine.

Oxgall. To the purgative enema add ten grains of powdered inspissated oxgall.

Oil. One pint of warm cotton-seed oil.

Nutritive Enema.—Oftentimes because of inability from various causes to give food by mouth, it becomes necessary to resort to nutritive injections. In order to properly give this form of enema, the patient should be placed on his left side with thighs flexed. A lubricated catheter should then be introduced into the rectum four to eight inches and connected with the tubing of a fountain bag placed two to three feet above the patient. These injections may be given every six to eight hours. The fluid to inject may consist of peptonized milk

alone or combined with beaten white of egg. To a child of three months about three ounces of food may be given; at six months, five ounces; at one year, seven ounces; over two years, one-half to one pint.

To Introduce Water.—Useful in septicemia, shock and hemorrhage. Use normal saline solution.

For Medication.—Uses: As a local medication; because of the ill taste of certain medicines; inability to take medicines by mouth, as in coma, because of nausea and vomiting, or disease of the stomach.

Medicines most commonly given per rectum are chloral, bromids, digitalis, and whiskey.

Asafœtida.—This is given for the purpose of relieving distention of the abdomen and colic. It is especially useful in the colic of infants. Take four ounces of the emulsion of asafœtida (made by agitating one dram of powdered asafœtida with four ounces of water) and four ounces of warm water.

Turpentine.—Also used to relieve tympanites:

Turpentine, 1 dram to 1 ounce.
Olive oil, ½ to 2 ounces.
Warm water to 4 ounces.

Quassia is used for pinworms in the rectum. To one dram of quassia add one-half pint of cold water, and allow to stand for three hours; then strain and use all for one injection.

Starch and Laudanum.—To some powdered starch add a small quantity of cold water and stir thoroughly. Then add sufficient boiling water to make a thin, clear, mucilaginous liquid. To one ounce of this solution add one to fifteen minims of laudanum.

TOPICAL APPLICATIONS

Poultices.—The uses of poultices are chiefly twofold: to apply heat and moisture. They relax the vessels and relieve tension and pain. The secret of making poultices consists in stirring the material into the boiling water and spreading it on hot cloths in a thick layer. Let the poultice remain on the surface of the body until cool and then replace with another.

Flaxseed.—Onto boiling water sprinkle ground flaxseed meal and stir vigorously, adding more meal until the mixture assumes the consistency of porridge. Then spread on the cloth.

Mustard.—Into a thin flaxseed meal poultice stir ground mustard in the proportion of from one to two, to twelve, according to the age of the patient and the desired action.

Bran.—Make a small bran cushion or pillow and pour over it boiling water; then wring it dry in a towel.

Bread.—Take thick slices of bread and pour on boiling water for five minutes; then break the bread and apply as a poultice.

Another method is to let the bread simmer for five minutes in the water, when the bread becomes pulpy. Apply.

Charcoal.—This form of poultice is very useful for removing the odor of putrid ulcers. To the bread or flaxseed poultice add powdered charcoal.

Counter-irritation.—In congestion and inflammation the little blood-vessels of the affected part are enlarged and contain more blood than normal, hence there is a reddening of the tissues. By applying to the skin certain drugs a congestive or irritative red area appears and

thus the seat of real congestion or inflammation is relieved of some of its blood. This process is known as counter-irritation. This medical procedure is very useful in bronchitis, pneumonia, pleurisy, neuralgias, pain of the congestive type, joint pains and colics. Of the household means, turpentine, mustard, kerosene, camphor and iodine are most commonly employed.

Mustard is employed in the form of a plaster, bath and pack. A *mustard plaster* for a child should be weak, one part mustard to three or four parts of flour, thoroughly mixed and stirred into a paste with lukewarm water, then spread on a cloth and applied to the part. When the skin is reddened (not blistered) the plaster is removed and the skin anointed with vaseline or sweet oil.

The *mustard bath* is made by adding to five gallons of warm water a tablespoonful of ground mustard. The child is placed in the bath and the skin gently rubbed until it glows, care being used to get none of the solution in the eyes. The child is then dried and placed in bed.

The *mustard pack* is a very fine form of counter-irritation in bronchitis and pneumonia. Into four ounces of alcohol put ten drops of the essential oil of mustard and add this mixture to three cupfuls of water, moisten a large piece of white flannel with it and wrap the cloth around the child from neck to navel, then envelop the child in a dry sheet until skin glows, which usually takes fifteen to thirty minutes, when the pack may be removed. This may be repeated twice or thrice in twenty-four hours if the skin condition will permit.

Turpentine is usually used in the form of turpentine and lard. This is now preferably succeeded by a mixture of camphorated oil and turpentine. A *turpentine stupe* is made by immersing a woolen cloth in hot water

containing fifteen to thirty drops of turpentine, and then applying to the body. This is especially used as an abdominal application in distention of the bowels with gas.

Kerosene is used for counter-irritation to quite an extent in the home. Nothing will be said of it here as we have other and better agents for this purpose.

Camphor in the form of camphorated oil is a very useful application, especially immediately after a mustard paste has been removed.

Iodine as tincture of iodine is an excellent drug for this purpose if rightly applied. At the first application four to six coats of the tincture should be put on, so that the skin takes on a very dark appearance, then no more should be used until the color of the skin is about natural. This may be a day or more.

Stupes.—*Turpentine.* Pour on a piece of flannel some very hot water; then wring the flannel dry in a towel and sprinkle with twenty to fifty drops of turpentine.

Another method is to add to one quart of boiling water one teaspoonful of turpentine; into this immerse the flannel and wring dry in a towel.

Chloroform and Turpentine.—Same as the turpentine stupe, adding five to fifteen drops of chloroform.

CHAPTER XXXII

ANTISEPTICS AND DISINFECTION

Bichlorid of mercury is used in watery solutions of from 1 to 500 to 1 to 1000. The most common dilution is the latter. This solution is used for the disinfection of the hands and tissues. For irrigating or for use in the abdomen weaker solutions, as from 1 to 2000 to 1 to 10,000. Bichlorid is liable to coagulate the albumen of the tissues and thus prevent deep disinfection.

Bichlorid of mercury should not be used to sterilize metallic instruments as it corrodes them and destroys the edges of sharpened instruments.

Toxic effects may result from the absorption of mercury through the skin. The signs are salivation, sore gums, foul breath, abdominal colic, diarrhea, etc.

In preparing solutions of the bichlorid of mercury it is best to add common salt, ammonium chlorid or citric acid, as these prevent the decomposition of the bichlorid.

Carbolic acid is next in importance. It is used in solutions ranging from 1 to 10 to 1 to 100. A 1 to 20 solution is most generally used for sterilizing instruments. A 1 to 100 solution is used for packs and irrigation.

Signs of carbolic acid poisoning are headache, dizziness, vomiting, painful urination, dark-colored urine, and diarrhea. Local gangrene has resulted from the application of weak solutions of carbolic acid.

Potassium permanganate is used for douches in a solution of 1 to 1000.

Iodoform is used especially in tubercular disease as iodoform gauze, emulsion, or powder.

Formaldehyd in two per cent. solutions for sterilizing the hands or instruments.

Hydrogen peroxid, used in the strength dispensed or diluted, is especially useful in cleansing pus cavities.

Creolin is used in two and four per cent. solutions for douches and irrigation.

Boric acid as a weak antiseptic for the eyes, nose and bladder.

Lysol, to be used as creolin.

Aristol has the same use as iodoform and is nearly free from odor.

Chlorinated lime is useful for disinfecting the excreta of the body.

TABLE OF SOLUTIONS

To one pint of water or the solvent used, add the following quantities of the chemical or drug:

For a 1 to 5000 or a 1–50 per cent. solution use 1½ grains.

For a 1 to 2000 or a 1–20 per cent. solution use 3⅔ grains.

For a 1 to 1000 or a 1–10 per cent. solution use 7⅓ grains.

For a 1 to 100 or a 1 per cent. solution use 73 grains.

For a 1 to 20 or a 5 per cent. solution use 365 grains.

For a 1 to 10 or a 10 per cent. solution use 730 grains.

Note.—To one ounce of water add one dram of chemical, and one dram of this solution when added to

one pint of water will give approximately a 1 to 1000 solution.

The New York State Department of Health issues a very instructive circular on "Disinfection and Disinfectants," which is here given in part:

Disinfection and Disinfectants

For the prevention of the spread of contagious and most infectious diseases nothing is more important after the diagnosis of the case than the proper care of the various discharges or excretions from the eyes, nose, mouth, skin, and of the excreta of the bowels and bladder of the sick.

As the diagnosis of the disease cannot always be made as soon as some of these discharges or excreta become dangerous to others, every person suspected of having either consumption, typhoid fever, diphtheria, smallpox, measles, whooping-cough or cerebrospinal meningitis should be treated as if the diagnosis had been made positively.

SICKROOM AND ITS CARE

Above all else, *cleanliness must be observed.* All other precautions are likely to fail in its absence.

1. The patient should be placed in an isolated room which should have in it as little furniture as possible. Iron bedsteads and plain wooden furniture are the most suitable. Carpets, draperies and curtains should be removed. A sheet kept moistened with carbolic solution (1–40) or bichlorid solution (1–1000) should be hung from the top of the door. The floor, woodwork and furniture should be wiped daily with a cloth moistened

preferably with carbolic solution (1–40). The floor should not be swept while dry. It should be sprinkled with sawdust, bran or other granular material thoroughly moistened with carbolic solution (1–20), and then carefully swept so that no dust may arise. *Flies should be absolutely excluded from the sickroom.* For this purpose mosquito netting should be tacked on the window frames outside so that each entire window is covered, and a screen door should be put up at the entrance to the room if flies are not excluded from the entire house. The sheet moistened with carbolic solution may be hung on this door. Household pets must be excluded.

2. Plates, cups, glasses, knives, forks, spoons and all other *utensils used by the patient should be kept for his use alone*, and under no circumstances should they be removed or mixed with similar utensils used by others. They should be placed in carbolic solution (1–20) immediately after use and remain there for an hour or longer, after which they should be washed in hot, strong soapsuds and rinsed with boiling water.

3. The patient's clothing, the sheets, pillow cases, towels, napkins and other clothing which have been in contact with the patient should be placed after use into carbolic solution (1–20) or bichlorid solution (1–500) for at least one hour, after which they should be thoroughly washed. The outside clothing worn by the attendant should be treated in the same manner.

4. Any articles or surfaces soiled by discharges should be immediately washed with carbolic solution (1–20).

5. The *discharges from the nose, mouth, ears or eyes* should be received on cloths or paper napkins, and these, together with remnants of food, should be burned

at once by the attendant. If handkerchiefs are used they should be immersed in carbolic solution (1–20) before the discharges dry.

6. *In cases of typhoid fever, scarlet fever and dysentery* the discharges from the bowels and the urine should be received into bedpans or other vessels containing small amounts of either carbolic solution (1–20), bichlorid solution (1–500), or chlorid of lime solution, and a quantity of the same disinfectant equal in volume to that of the discharges should be added, and the whole protected from flies and allowed to stand for one hour and then dumped into the water-closet. If only a privy is available, fresh chlorid of lime should be added, followed by earth or ashes; or the disinfected stools may be buried in a trench, which must be remote from and, if possible, down hill from the well or nearest water-course. The trench should be four feet deep and two wide, and each deposit should at once be well covered with quicklime and earth well beaten down, the trench being covered in with earth when half filled in this manner. Or the discharges may be mixed with sawdust and kerosene and placed in a water-tight kerosene barrel, and after recovery or death add more kerosene and burn the entire barrel and contents.

7. *The body of the patient should be washed daily* with warm water, or as directed by the physician, and the water that has been used in such baths should have added to it an equal quantity of chlorid of lime solution or carbolic acid solution (1–20) and allowed to stand for one hour, when it can be emptied down the water-closet or into the privy.

8. After making applications to the throat, nose, ears, eyes or after handling the patient in any way,

before eating, or leaving the sickroom, *the hands of the attendant should be immersed in carbolic solution* (1–40) or bichlorid solution (1–1000) and then thoroughly rubbed in hot soapsuds.

Upon notice from the health officer or physician that the sickroom is ready for disinfection, everything which has been used by the patient or attendant during the illness should be allowed to remain in the room for disinfection.

10. If the disease should terminate fatally, the body should be wrapped in a sheet saturated with corrosive sublimate solution (1–500) and placed in a tight coffin, which should not be opened afterward, and burial should take place within twenty-four hours, if possible.

DISINFECTION OF ROOMS

Preparation of Room.—1. *Carefully close all windows and doors*, except one door for exit. Paste paper over stovepipe hole, and over all window, transom or door cracks. In a word, seal the room tightly from the inside.

2. Open closet doors, drawers, trunks, boxes, etc. Suspend clothing and bedclothes upon lines stretched across the rooms, or spread out on chairs or clothes-horses. Books must be opened and the leaves spread; in short, the room and its contents must be so disposed as to *secure free access of gas* to all parts and to all objects.

3. The next point is to *make the air in the room damp;* this is absolutely necessary for disinfection, either by sulphur or formaldehyd. Dampness may be produced (*a*) by boiling water on a gas or gasoline stove; (*b*) by pouring boiling hot water from a teakettle into a

tub; (*c*) by pouring cold water onto hot bricks or stone, or by dropping hot bricks or stones into vessels containing cold water. Under no circumstances is efficient disinfection possible without in some way making the air of the room quite damp. The temperature should also be 60° F. or over.

4. Measure the room, and get the length, breadth and height in feet. Multiply the figures together, disregarding the fractions. This will give the cubical contents of the room in feet. Divide by 1000, and we know the number of thousand cubic feet in the room. Example: Suppose a room to be 24 feet long, 13½ feet wide and 12¾ feet high. Disregarding fractions, the cubical contents of the room is $24 \times 13 \times 12$ ($= 3744$) cubic feet, and the number of thousand cubic feet is 3.7 or, approximately, 3¾.

Sulphur Disinfection.—For each 1000 cubic feet, weigh out four pounds of powdered or roll sulphur and place it in an iron kettle or dishpan, or take four tins of pressed sulphur, or four one-pound sulphur candles, setting the last in saucers. For the room mentioned in the above example, fifteen pounds of sulphur would be used. Stand the dishpan, tins or saucers in a tub containing two inches or more of water, and place the same on a table; do not put it on the floor. The water is put in the tub to guard against fire; it must not come in contact with the sulphur, and bricks can be placed under saucers to prevent this. Dampen the powdered or roll sulphur in a spot not larger than a silver dollar with alcohol or coal oil, and apply a match to the same or to the wicks of the candles. Without delay, retire from the room, closing the door, and paste paper on the outside of the keyhole and cracks. The room must re-

main closed for at least ten or, better, twenty-four hours. When the time is up, the windows should be opened, if possible from the outside, and the room thoroughly aired. The room and contents may now be considered free from infection, if the work has been properly carried out, but any mattresses, rugs, carpets, blankets and other unwashable materials must be hung in the open air and sunshine for several days. Sheets, pillow cases, bedclothes and the patient's and attendant's clothing should be thoroughly washed, using boiling water. The floor, woodwork, bureau, bedstead, table and chairs must be washed with soap and water.

Disinfection with Formaldehyd Gas.—Prepare the room as described above. Take one pint of forty per cent. solution of formaldehyd and eight ounces of crystalline permanganate of potassium for each 1000 cubic feet. The room mentioned above would need three and three-quarter pints of formaldehyd and thirty ounces of permanganate. Place the permanganate in a dishpan, stone crock or other vessel large enough to hold as many gallons as there are pints of formaldehyd. This is to make sure the liquid will not boil over. Set the pan or crock inside of a slightly larger wooden pail, tub or crock, to retain the heat generated in the mixture; or wrap the pan or crock in two layers of asbestos paper or blankets. Now the vessel containing the permanganate is placed in the center of the room and the formaldehyd is poured onto it from a pitcher. The operator must immediately retire from the room and close the door. Keep the room closed for six to ten hours, then open all windows and doors and air thoroughly. Finally, clean all the contents of the room, as directed after sulphur disinfection.

Formaldehyd gas does not injure fabrics nor metals as does sulphur. It must not be breathed, and it would be well not to have the strong liquid formaldehyd come into contact with the skin. Formaldehyd disinfection can be accomplished in other ways very satisfactorily, but such methods should be used only by those having considerable training and experience with methods of room disinfection. Do not use any methods unless the same have been personally recommended to you by a physician or a person expert in the details of room disinfection. Do not rely upon patented solutions and methods.

Disinfection of Clothing.—If one's clothing becomes infected by visiting cases of measles, scarlet fever, diphtheria, etc., or in any way, it may be disinfected with formaldehyd as follows: Place the clothing in a trunk, wash-boiler or covered box, one piece at a time, covering each piece with a towel, pillow-slip, sheet or piece of cloth, and sprinkle or spray on each cover, as it is laid on, two tablespoonfuls of forty per cent. formaldehyd. When the trunk or boiler is full, put on the cover and let stand for six hours, then open and air the clothing. Each piece of clothing must be covered to protect it from being spotted by the formaldehyd.

CHAPTER XXXIII

ABBREVIATIONS, WEIGHTS AND MEASURES

ABBREVIATIONS

Aa.—Of each.
A. C.—Before Meals.
Aq.—Water.
Aq. Bul.—Boiling Water.
Aq. Dest.—Distilled Water.
Aq. Ferv.—Hot Water.
Aq. Font.—Spring Water.
Bene.—Well.
B. I. D.—Twice a Day.
C.—With.
Cochl.—Spoonful.
Cras.—To-morrow.
D.—Dose.
Ft.—Make.
Gr.—Grain.
Gm.—Gram.
Gtt.—Drop.
M.—Minim.
O.—Pint.
P. C.—After Meals.
Q. 4. H.—Every Four Hours.
Q. S.—Sufficient Quantity.
Sine.—Without.

Stat.—Immediately.
T. I. D.—Three Times a Day.
IV. I. D.—Four Times a Day.

WEIGHTS AND MEASURES

Apothecary's Weight.

60 Minims, 1 Dram.
8 Drams, 1 Ounce.
16 Ounces, 1 Pint.

Troy Weight.

20 Grains, 1 Scruple.
3 Scruples, 1 Dram.
8 Drams, 1 Ounce.

Metric Values.

0.0081 Gram, 1–8 Grains.
0.056 Gram, 7–8 Grains.
0.1 Gram, 1.54 Grains.
0.5 Gram, 7.71 Grains.
0.9 Gram, 13.89 Grains.
1. Gram, 15.43 Grains.
1. CC., 16.23 Minims.

Equivalents.

1 Grain, 0.065 Grams.
2 Grains, 0.13 Grams.
5 Grains, 0.324 Grams.
15 Grains, 0.972 Grams.
480 Grains, 31.103 Grams.
1 Minim, 0.0616 CC.
2 Minims, 0.1232 CC.
5 Minims, 0.3080 CC.
60 Minims, 3.7 CC.
480 Minims, 29.6 CC.

1 Pint, 0.473 Liters.
1 Quart, 0.946 Liters.
1 Gallon, 3.784 Liters.
1 Liter, 33.8 Ounces.

Domestic Measures.

1 Teaspoonful, 1 Dram or 4 CC.
1 Dessert-spoon, 2 Drams or 8 CC.
1 Tablespoon, 4 Drams or 16 CC.
1 Wine glass, 2 Ounces.
1 Tea cup, 5 Ounces.
1 Tumbler, 11 Ounces.

Thermometric Equivalents.

212.°	Fahrenheit	—100.°	Centigrade.
120.°	"	— 49.°	"
100.°	"	— 37.77°	"
98.6°	"	— 37.°	"
80.°	"	— 27.°	"
60.°	"	— 16.°	"
50.°	"	— 10.°	"
32.°	"	— 0.°	"
0.°	"	— 17.78°	"

To reduce Centigrade to Fahrenheit, multiply by nine and divide by five, and add thirty-two.

To reduce Fahrenheit to Centigrade, subtract thirty-two, multiply by five, and divide by nine.

CHAPTER XXXIV

SELECTED FORMULAS

Bichlorid of Mercury (1–1000)

Bichlorid of Mercury about	7½	grains.
Common Table Salt, about	8	grains.
Boiled Water	1	pint.

NOTE.—This solution is extremely poisonous and should only be used externally and for disinfecting purposes as described in the text or by the attending physician.

Bichlorid of Mercury (1–5000)

Bichlorid of Mercury about	1½	grains.
Boiled Water	1	pint.

NOTE.—Poisonous.

Carbolic Acid (5 *per cent. or* 1–20)

Crystal Carbolic Acid about	6½	drams.
Hot Water	1	pint.

Shake well before using. Poisonous.

Carbolic Acid (1 *per cent. or* 1–100)

Crystal Carbolic Acid about	1¼	drams.
Hot Water	1	pint.

Poisonous.

Formaldehyd Solution (1 *per cent. or* 1–100)

Formalin about	1⅕	drams.
Boiled Water	1	pint.

Creolin Solution (1 *per cent. or* 1–100)

Creolin about	1¼	drams.
Boiled Water	1	pint.

Potassium Permanganate Solution (1–1000)

Potassium Permanganate Crystals	7½	grains.
Boiled Water	1	pint.

NOTE.—The stains on clothing from this solution are difficult to remove.

Boric Acid Solution (4 *per cent. or* 1–25)

Boric Acid Crystals about	77	grains.
Boiled Water (warm)	4	ounces.

Boric Acid Solution (0·1 *per cent. or* 1–1000)

Boric Acid Crystals about	7½	grains.
Boiled Water (warm)	1	pint.

Mouth Wash (*No.* 1)

Boric Acid Crystals about	1	dram.
Glycerine	2	drams.
Juice of Half Lemon		
Warm Water	8	ounces.

Mouth Wash (*No.* 2)

Potassium Permanganate Crystals	7½	grains.
Warm Water	1	quart.

Mouth Wash (*No.* 3)

Sodium Bicarbonate	1	dram.
Thymol	2	grains.
Glycerine	1	dram.
Water	½	pint.

Normal Salt Solution

Common Table Salt	48	grains.
Water	1	pint.

Boil together for five minutes.

Mentholated Oil

Menthol Crystals	1 ounce.
Olive Oil	4 ounces.

Compound Starch Powder

Powdered Boric Acid	½ dram.
Powdered Salicylic Acid	15 grains.
Corn Starch	4 ounces.

CHAPTER XXXV

MISCELLANEOUS NOTES

The Stools.—*Green.* In gastro-intestinal disease of children, excessive flow of bile, after taking calomel.

Black.—From altered blood, after certain foods as spinach, huckleberries; certain medicines as iron, bismuth, tannin, and charcoal.

Yellow.—In typhoid fever, certain drugs as senna, santonin, and rhubarb.

Red.—After administering logwood.

Watery.—In profound diarrheas, cholera, poisoning by mercury, arsenic, and antimony.

Mucous.—In inflammation of the colon, dysentery, after prolonged constipation.

Fatty.—In faulty pancreatic digestion; in the absence of bile, as in obliterative jaundice; after the ingestion of an excessive amount of fat.

Purulent.—From ruptured abscesses of the intestinal tract, fistula in ano, dysentery, suppurative enteritis.

Bloody.—In typhoid fever, ulcers of the intestines, dysentery, intussusception, intense anemia, scurvy, acute enteritis.

Expectoration.—*Mucous.* It is glairy and clear, like the white of an egg, and occurs in acute bronchitis, asthma, and edema of the lungs.

Purulent.—In ruptured empyema, abscess of the lung, ruptured abscesses of the mediastinum and liver.

Mucopurulent.—In bronchitis, lobar pneumonia, tuberculosis.

Serous.—In edema of the lungs.

Bloody.—In beginning pneumonia, tuberculosis, cancer of the lung, congestion of the lung following heart disease.

Pulse.—*Rapid*. In fevers, tuberculosis, infections, exophthalmic goiter, shock, rheumatoid arthritis, locomotor ataxia, valvular heart disease, certain drugs.

Slow.—In disease of the heart muscle, as fatty degeneration; in jaundice; brain tumor; basal meningitis; during the convalescence of pneumonia and typhoid fever; after drugs, as digitalis, aconite, opium, and strophanthus.

Temperature and Pulse Ratio

Pulse of 72 corresponds to 98.6°F.
Pulse of 80–90 corresponds to 100°F.
Pulse of 100–115 corresponds to 102°F.
Pulse of 120–130 corresponds to 104°F.

Pulse at Various Ages

First year	Pulse = 120	Respirations = 36
Second year	" = 108	" = 30
3– 6 years	" = 96	" = 24
6–12 years	" = 84	" = 20
Adult life	" = 72	" = 18
Old age	" = 80	" = 20

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